The Iron Age

A Review of the Hardware and Metal Trades.

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The Torsion Spring.

The principle of the "Torsion" spring is not wholly new, but its adaptation to mechanical appliances other than door springs—for which it has been in successful use for the last 25 years—is of very recent date.

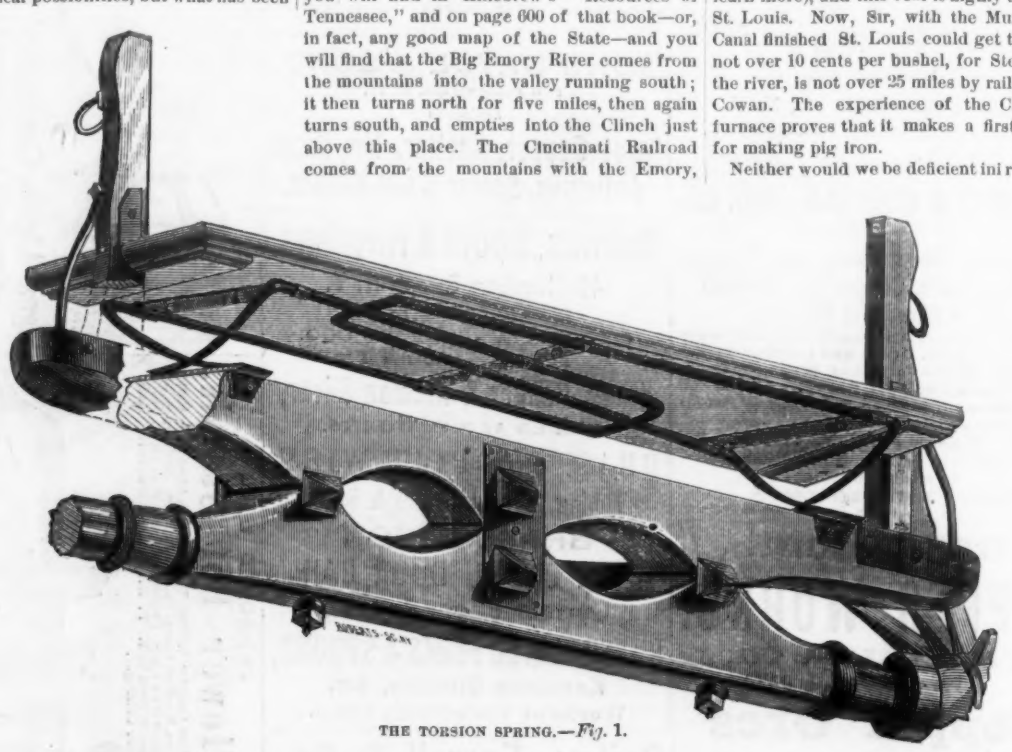
We have lately examined the Torsion spring applied to a wagon seat. It springs very easily with a light person sitting on it, and it has the rare quality of carrying easily and gently a great weight without striking down. This quality of itself it is difficult to account for, but it is nevertheless true in a marked degree. The principle is shown in Fig. 2. The rod of steel held firmly at D and E, turning in the staple at C, is twisted from C to D by the lever A C, formed from the same rod, from A to B Should the power be removed the lever A C will resume its original position, indicated by dotted lines.

This manner of twisting the steel rod, by a lever formed from the same rod, by simply bending it at a right angle, thus obtaining a spring of any desired power, is a useful invention. They have been subjected to the severest tests on some of our railroads with satisfactory results. There are nearly one thousand cars now mounted on them in the State of Pennsylvania, and after over three years' use they are pronounced a success. They stand the winter test thoroughly, and do not crystallize or settle like coil or elliptic springs. A set was recently taken from a car on the Philadelphia and Erie Road and brought to this city to be examined by experts. They were compressed by sledge hammer blows to find the point where it was supposed they had crystallized, but the most thorough test failed to develop any trace of it. They were apparently as sound as when placed on the car in May, 1871.

Fig. 1 is an illustration of the wagon spring as applied to the common farm wagon. They are made in different sizes, to carry loads ranging from 800 lbs. to five tons. They are simple, light, easily applied, and apparently as effective as the best elliptic spring, and must cost very much less. No spring has heretofore been invented which can be readily applied to this class of wagons. They have been in use for this purpose for the past five years, giving entire satisfaction. A pole spring made on the same principle is very highly spoken of by those using them, and they also possess the rare qualities of simplicity, effectiveness and cheapness.

Fig. 2 shows a sectional view of the wagon spring partly loaded down. It will be observed that as the spring loads down the levers or points, A B, turn up and give a shorter leverage, thus making the spring stiffer or stronger as it is loaded down. When light it raises up on the longer points or ends of the lever, C A, making a light load carry easily.

Messrs. Schenck & Sheridan, of Fulton, N. Y., have the general agency of the United States for the sale of these springs, which are manufactured by the Erie Torsion Spring Co., Erie, Pa.



THE TORSION SPRING.—*Fig.* 1.

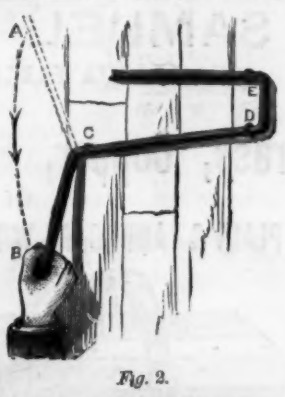


Fig. 2.

New Sources of Coal and Iron Ore Supply.

KINGSTON, ROANE CO., TENN.

To the Editor of The Iron Age:—You have been ever ready to bring to light the resources of our Southern country, and I was pleased to see the article in your issue of November 19th, on "New Sources of Coal and Ore Supply in Alabama." The proposed railroad you there bring to notice would develop a small coal field, only three square miles, you say. Some of the coals of this field are good and some poor, but none of them can be worked as cheaply as the horizontal seams of the East Tennessee fields, because they dip into the ground and usually run far below the water level. Parts of the Cahaba fields, the Raccoon and Lookout Mountain, are different, and can be very cheaply worked.

But if my Alabama friends can themselves build their railroads, or get others to do it, and develop their coal veins, no one will wish them more hearty success than myself; but I propose to point you to a place where $2,500,000 can be more profitably invested, and yield a greater good to a greater number.

Major McFarland, a skilled and reliable officer of the United States engineer corps, reports that the expenditure of $2,128,500 will make a canal around Muscle Shoals, so that boats 120 feet long 20 feet wide and, drawing 4 feet water, say of 320 tons capacity, can pass easily. Now, these shoals are the only serious obstruction existing for a nine month's navigation of the Tennessee River from this place to its mouth at Paducah, and the cutting of that canal would enable us to ship heavy goods direct to St. Louis, Louisville, Pittsburgh or Cincinnati. Again, for full six months of the year the Clinch and Powell's rivers are navigable far up into Southwest Virginia; the Halston, too, can for about the same time be navigated up to the Virginia line, the Little Tennessee and the French Broad almost to the North Carolina line, while the Clinch, for full eight months, may be navigated within four miles of Coal Creek mines, and the Emory for the same time will safely carry barge or steamboat within a few hundred yards of the point where excavations for the Cincinnati Southern Road have opened veins of superb coals 4 and 5 feet thick. From this place (Kingston, Roane county, Tenn.) to Cairo by water is 850 miles; to St. Louis, 1050. The only bar this day to a steamboat taking six or eight barges loaded with our superb grate, furnace or coke coal, and landing the cargo in St. Louis in a week or less, is the Muscle Shoals. We can mine the coal and put it in the barges (run of mine) at 3 cents; lump at 3½ cents per bushel of 80 lbs. I do not state theoretical possibilities, but what has been done and is being done. At Coal Creek, Mr. R. E. McEwen is paying his miners 2½ cents per bushel for run of mine, and can get more than he can employ. He has a large contract with the E. T., Va. & Ga. Railroad, and supplies that road coal, run of mine, at 6¼ cents per bushel at his shute, and says with 10 cars (200,000 lbs.) a day he can make money handsomely, and a week's careful examination of his business and his work has convinced me that he states the truth, but there is no playing or loafing about his place by anyone, himself included. Yet he, by a misfortune, has to pay a double royalty amounting to 2 cents per bushel (80 lbs). Within four miles of Mr. McEwen's mine is the Clinch River. Coal Creek Valley furnishes a level road to it, and the stream itself a good harbor. If the Muscle Shoals could be passed, boats could be loaded by him, (a tram road being built for two miles), for St. Louis, and he rates the coal, profit and all, at six cents per bushel on board. Two cents per bushel would deliver it in St. Louis, making 8 cents in all, or $2 per ton of 2000 pounds, with ample margin for broker's profits. And this would be done at a time when the Ohio is no longer navigable above Cincinnati.

The above is what is actually being done and can be done at Coal Creek, but this place has greater advantages. The United States government has so improved the river that boats drawing two to three feet of water can run all the year to Chattanooga, and for full nine months might draw five to six feet with perfect safety. The steamer J. T. Wilder, owned by Capt. Joseph Glover, of Chattanooga, has made regularly one trip, and frequently two trips, a week, to this place all the summer, coming up loaded with supplies and men for the C. S. R. R. work in the mountains, and loading back with 100 to 200 tons of pig iron from the Roane Iron Co.'s furnace. Other steamers have made irregular trips. You are well aware that this cannot be done from Pittsburgh on the Ohio for more than six months of the year. If the Muscle Shoals Canal was finished, we could send coal and iron ore to St. Louis, Evansville, Louisville, &c., at the very time when the Ohio is not navigable on account of low water or ice. Beside, improvement of the Tennessee will be permanent, as our bars are caused by the strata of limestone shooting across the river. Once blasted out, they will not return, while the bars on the Ohio are gravel and sand, and renew themselves every year.

I have stated that two veins of coal have been opened by the Cincinnati Southern Railroad excavations within a few hundred yards of navigable water. Now, open the map of Tennessee you will find in Killebrew's "Resources of Tennessee," and on page 600 of that book—or, in fact, any good map of the State—and you will find that the Big Emory River comes from the mountains into the valley running south; it then turns north for five miles, then again turns south, and empties into the Clinch just above this place. The Cincinnati Railroad comes from the mountains with the Emory, and turns down the valley. From the point of its exit from the mountain to this place in an air line is hardly five miles; by a route on which a railroad could cheaply be built (and will be) is only six miles; to follow around the Emory would be thirteen miles; but the Emory, for the north five miles of its course, skirts the foot of Walden's Ridge, where there is known to be one vein of coal five feet thick, excellent for making iron raw or for coking. Other veins are known to exist, but have not been tried, and between it and the mountain also runs the great continuous vein of fossiliferous red hematite, never less than three feet thick, and, so far as ascertained, continuing for hundreds of feet down under the mountain. Just where the Emory turns south to the Clinch it receives the Little Emory, which stream affords another opening into the Cumberland coal lands beyond Walden's Ridge. The fire by which I am now sitting is made in an open fire place, of coal from a three foot vein on this stream. The owner mines it and hauls six miles in wagons to the river, then boats it to this place, and says he makes money selling it at 20 cents per bushel, and if he had a tram road, could make as much at 10 cents. From this junction of the streams the Emory is navigable for boats drawing four to six feet of water for full eight months of the year, and an expenditure of $2000 on an obstruction in the Clinch would make it navigable all the year. This point is convenient as a center for 10 miles of the Walden's Ridge, and through Little Emory Sop for full 50 square miles of coal land underlaid with not less than a dozen veins of excellent coal, all of them workable. The Wilcox mine, already opened in Walden's Ridge, has a tram road to the river, and would gladly contract to deliver first-class furnace and coke coal to the river in large quantities at 5 cents per bushel, and they would make 2 cents per bushel profit at that price.

Thus you see, Sir, that this point possesses special advantages, and that all we need to do an immense coal trade is a passage around Muscle Shoals. It is not alone our interest, but it is the interest of St. Louis. When this country becomes a great coal and iron producing region, its farms will not yield more than enough grain to bread the workers, hence it will not, as now, ship to the cotton States near two million bushels of corn and wheat. The West may supply this and many other articles of consumption. Thus the boats from St. Louis would have return loads. A steamboat building at this place now has had her machinery made in St. Louis, and it is brought to Chattanooga by rail, thence by water. We now pay out the cash for it, say $4000. If the Muscle Shoals Canal was completed we could pay them in coal at $2 per ton, and make $1000 on it, equivalent to getting the machinery for 25 per cent. less.

While I have spoken particularly of this place, because it is virtually the head of navigation, the same remarks will apply of many points between this and Chattanooga, and beyond that city. Six miles below, coal can easily be run direct from the mine into the boat, and the Dade mines would be glad to make large contracts for this coal at Shell Mound at 7 cents per bushel. St. Louis is now getting coal from Col. Colzar's Sewanee mines by the Green Line cars, he delivering to them at Cowan, on the N. and C. and St. L. R. R. for less than 8 cents per bushel (the contract is private, and I could not learn more), and this coal is highly approved in St. Louis. Now, Sir, with the Muscle Shoals Canal finished St. Louis could get this coal at not over 10 cents per bushel, for Stevenson, on the river, is not over 25 miles by railroad from Cowan. The experience of the Chattanooga furnace proves that it makes a first-class coke for making pig iron.

Neither would we be deficient in iron ores. I know vast beds from which tons on tons might be dumped directly into the river, and the quality of all our native ores is good. The Clinch, the Emory, the Main Tennessee, and its tributary, the Hiwassee, all flow through and near long and deep veins of fossiliferous red hematite and vast beds of limonites. The banks of these streams, too, afford access to acres of forest trees yet untouched by the axe, walnuts that surpass anything ever seen in the Wabash Valley, and oaks that would make the boat builders heart leap with joy. With the Muscle Shoals Canal open they could be used profitably for boats, or shipped to market in cities of the treeless Western plains. There is no danger of exhaustion. Go with me to the places where the old settler recklessly hewed down trees to make his iron in the old fashioned forge, using 100 cords to a ton; thirty years ago he swept it clean, to-day you would declare it was the original growth. For years Mr. Craven, of Chattanooga, ran a 4 ton furnace 18 miles below this place. About 1858 he moved to Chattanooga; to-day, but for the word of the old settler, you could not tell where he got the wood which he used at the rate of full 6 cords to the ton.

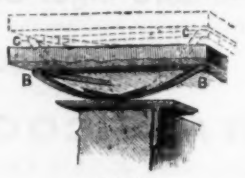


Fig. 3.

The progress of this country may be slow but it is sure; we simply need facilities. Give us easy and cheap transportation and we have bold, daring spirits who will do the rest. The restless energy of Col. Byrd, who surprised the Nashville and Chattanooga Railroad managers in the hight of the flood of 1867, by loading his three steamboats and half dozen barges at Bridgeport, and not only contracting to carry across the gap their freight and passengers, but in punctually fulfilling the contract, is yet alive, and there are many like him. The young men of the country are learning to work, and are working. We can make cold blast charcoal iron here for $18 per ton, can make hot blast for $16 to $17, can make coke iron for $14 to $15, and raw coal iron $13. Give us the Muscle Shoals Canal and we can put these irons in St. Louis at not over $2 per ton freight. These are not fancy figures, practical work is every day proving them, and I say to one and all, if you do not believe me, come and I will prove every word.

HENRY E. COLTON.

Hammers.

Few people in using a simple hand hammer ever think of it as an engine giving out tons of force, concentrating and applying power by functions which, if performed by other mechanism, would involve trains of gearing, levers or screws; and that such mechanism, if employed instead of hammers, must lack that important function of applying force in any direction the will may direct. The general characteristic of all forging machinery is that of a great force acting through a short distance. The conditions of short range and great force are best attained by what can be called percussion machines, which act by blows instead of gradual pressure; and hence we find that hand and power hammers are the most common tools of a smith's shop. A hammer head may by its momentum give a blow equal to a dozen tons, and absorb the reactive force that is equal to the blow; but if an equal force was to be exerted by screws, levers or hydraulic apparatus, a very strong abutment would be required to withstand the reactive force.

This principle is somewhat obscure, and the nature of percussion force not generally considered. Mr. J. Richards, of London, who is writing a series of articles on the principles of shop manipulation, for engineer apprentices, in *Engineering*, directs attention to percussive agents generally, and illustrates his subject by investigating the action of a simple hand hammer. He says that a simple hand hammer is in the abstract one of the most intricate of mechanical agents; that is, its action is more difficult to analyze than that of many complex machines involving trains of mechanism; but our familiarity with hammers makes us overlook this fact, and they have even been denied a place among those mechanical contrivances to which there has been applied the mistaken name of mechanical powers.

Let the reader compare a hammer with a wheel or axle, inclined plane, screw, or lever, as an agent for concentrating and applying power, noting the principles of its action first, and then considering its universal use, and he will conclude that if there is a mechanical device that comprehends distinct principles, that device is a common hammer. It seems, indeed, to be one of those things provided to meet a human necessity, and without which mechanical industry could not be carried on. In manipulation of nearly every kind the hammer is continually necessary, in order to exert a force beyond what the hands may do unaided by mechanism to multiply their force. A carpenter in driving a spike requires a force of from one to two tons; a blacksmith requires a force of from five pounds to five tons to meet the requirements of this work; a stonemason applies a force of from one hundred to one thousand pounds in driving the edge of his tools; chipping, calking—in fact nearly all mechanical operations consist more or less in blows, and blows are but the application of accumulated force, expanded through a limited distance. As a mechanical agent a hammer concentrates the power of the arms, and applies it in a manner that meets the requirements of different kinds of work. If great force is requird, a long swing and slow blows accomplish tons; if but little force is required, a short swing and rapid blows will serve; the degree of force being not only continually at control, but the direction at which it is applied, also. Other arrangements, if employed instead of hammers to perform the same duty, would, from their nature, require to be complicated machines, and act in but one direction or in one plane.

Machines or tools operating by percussive action, although they comprise a numerous class, and applied in nearly all mechanical operations, have never received the amount of attention in text books that their nature calls for, nor their extensive use warrants. Such machines have not even been set off as a class and treated of separately, although the distinction is quite clear between machines with percussive action and those with what may be termed direct action, both in the manner of operating and in the plans of their construction.

Bayliss' Vertical Hot Blast and Water Tuyere Forge.—This excellent forge, of which we published an illustrated description some months ago, is now coming into very general use, and is well spoken of wherever it has been introduced. The principle of its construction is new, and its satisfactory working shows it to be correct. Instead of passing into the fire cold, the blast takes the circuit of a hot chamber surrounding the tuyere, and enters the fire at a temperature of 300° F. through the tuyere—a hollow casting filled with water, which is kept circulating by pipe connections with a tank—and is projected vertically into and through the fire. For ordinary blacksmiths' work, and especially for welding, this forge is very useful and convenient. During the recent fair of the American Institute we saw a bar of steel three inches square brought to a welding heat in one of these forges in eight minutes, with no more body of fire than would have been needed to bring it to the same temperature with a cold blast in fifteen minutes. We also saw a bar of steel about an inch and a half square, heated for experimental purposes, and in ten minutes two inches, by measurement, had been burned off the end. The water tuyeres are very durable, and an important economy in time and fuel is claimed for the hot blast principle. These forges are manufactured by Mr. John Bayliss, No. 157 East Fifty-fourth street, N. Y.

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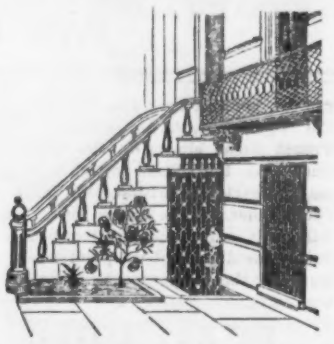

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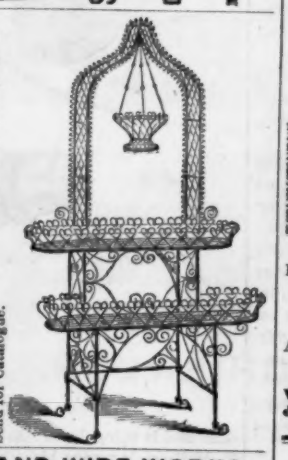

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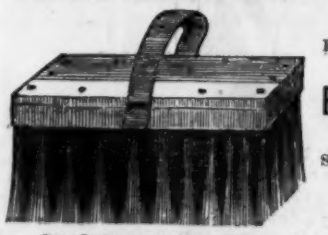

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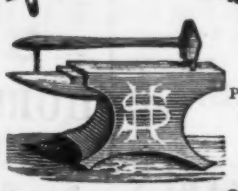

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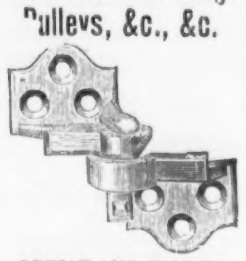

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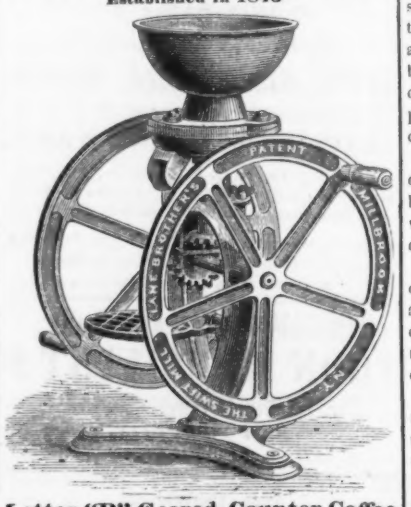

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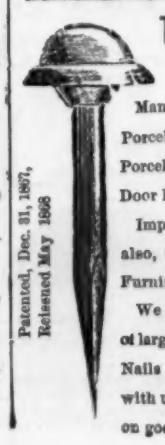

Patented, Dec. 31, 1867, Released May 1868

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The Deposition of Alloys.

(Concluded.)

Many attempts have been made to deposit alloys of metals from their solutions. That two or more metals can be deposited from a solution we have seen sufficient evidence; but the means to regulate the proportions of each, and to make such a process practical, have yet to be discovered. It is hardly possible to get a mixed solution of any two metals that are exactly equally decomposable; or, in other words, that the metals under the circumstances in which they are placed are exactly of equal conducting power. Hence the electric current will always travel through the one that offers the least resistance, and there will be none of the other metallic solution decomposed, or metal deposited, until the quantity of electricity is greater than the best conducting metal in the solution will allow to pass; then the other metal will be deposited in proportion to the extra electrical power that passes. As, for example, take a mixture of cyanide of gold, silver and copper, in cyanide of potassium. The silver in this state is so much superior in its conducting power to the other salts, that all the silver may be deposited from the solution by a weak battery without any of the other metals. If the solution be afterward heated, and the battery power kept so that no gas is allowed to escape from the articles, the gold may be deposited without any copper; but if the gas is allowed to flow from the article receiving the deposit, the copper will be deposited, and often more abundantly than the gold, as the escape of gas is not consistent with a reguline deposit of gold. We have thus deposited an alloy of gold and copper; we have also deposited gold and silver, but the alloy was very inferior and irregular. Alloys can be obtained from silver and palladium, from cyanide solution, from zinc and copper, from a solution of their sulphates; but in no instance have we found good alloys, or alloys that could pass as such in name or appearance. We have seen articles, such as iron, covered with copper and zinc in this manner, or in alternate layers, and the articles having the coating heated in charcoal, by which means a brass of fair appearance was obtained, but the process is attended with practical difficulty, and product cannot be called deposited brass.

Several patents have been taken out for the deposition of alloys of various sorts. The following by Morris and Johnson, embraces a wide range, and being well described we will copy the specification:

"This invention consists in the employment of solutions composed of cyande of potassium and carbonate of ammonia, to which are added cyanides, carbonates, and other compounds of metals, in proportions according to the amount of deposit required to be made.

"In order that the invention may be fully understood and carried into effect, the patees proceed to describe the means pursued by them as follows:

"These improvements consist in the employment of solutions composed of carbonate of ammonia (the carbonate of ammonia of commerce, or the sesque-carbonate of ammonia of chemists), and cyanides of potassium, to which are carbonates, cyanides, or other compounds of metals, in various proportions. For the well-known alloy, brass, carbonate of ammonia and cyanide of potassium are used in the following proportions, namely, to each or every gallon of water are added 1 lb. of carbonate of ammonia, 1 lb. of cyanide of potassium, 2 ozs. of cyanide of copper, and 1 oz. of cyanide of zinc. These proportions may be varied to a considerable extent; or the patentees take the before-named solution of carbonate of ammonia and cyanide of potassium, in the proportion of 1 lb. of each to one gallon of water; and they take a large sheet of brass of the desired quality and make it the anode or positive electrode, in the aforesaid solution, of a powerful galvanic battery or magneto-electric machine, and a small piece of metal, and make it the cathode or negative electrode, from which hydrogen must be freely evolved. This operation is continued till the solution has taken up a sufficient quantity of the brass to produce a reguline deposit. The solution may be used cold; but it is desirable, in many cases, to heat it (according to the nature of the article or articles to be deposited upon) up to 212° Fahr. For wrought or fancy work about 150° Fahr. will give excellent results. The galvanic battery, or magneto-electric machine, must be capable of evolving hydrogen freely from the cathode, or negative electrode, or article attached thereto. It is preferred to have a large anode, or positive electrode, as this favors the evolution of hydrogen. The article or articles treated as before described will immediately become coated with brass. By continuing the process, any desired thickness may be obtained. Should the copper have a tendancy to come down in a greater proportion than is desired, which may be known by the deposit assuming too red an appearance, it is corrected by the addition of carbonate of ammonia, or by a reduction of temperature, when the solution is heated. Should the zinc have a tendency to come down in too great a proportion, which may be seen by the deposit being too pale in its appearance, this is corrected by the addition of cyanide of potassium or by an increase of temperature.

"The alloy, German silver, is deposited by means of a solution consisting of carbonate of ammonia and cyanide of potassium (in the proportions previously given for the brass), and cyanides or other compounds of nickel, copper and zinc in the requisite proportions to constitute German silver. It is, however, preferred to make the solution by means of the galvanic battery or the magneto-electric machine, as above described for brass. Should the copper of the German silver come down in too great a proportion, this is corrected by adding carbonate of ammonia, which brings down the zinc more freely; and should it be necessary to bring down the copper in greater quantities, cyanide of potassium is added, such treatment being similar to that of the brass before described.

"The solutions for the alloys of gold, silver, and other alloys of metals, are made in the same manner as above stated, by employing anodes of the alloy or alloys to be deposited, or by adding to the solutions, the carbonates, cyanides or other compounds, in the proportions forming the various alloys—always using in depositing an anode of the required alloy. These solutions are subject to the same treatment and control as those of the brass and German silver before described.

"The patentees claim the combination of the carbonate of ammonia, before named, or other carbonates of ammonia and cyanide of potassium, as the ingredients for their solutions for depositing alloys of metals."

The expense of depositing common metals will remain a barrier to the use of electro-metallurgy in making such alloys as brass, a consideration which some patentees do not seem to consider. We have the following given as methods for mixing up solutions for depositing brass, which will prove our position:

"As an illustration of this invention we take the patentee's method of depositing a coating of brass by galvanic agency, in which he employs the following: 1. A solution of the double chloride of zinc and ammonia. 2. A solution of the double chloride of zinc and potassium. 3. A solution of the double chloride of zinc and sodium. 4. A solution of the double acetate of zinc and ammonia. 5. A solution of the double acetate of zinc and potassium. 6. A solution of the acetate of zinc and soda. 7. A saturated solution of carbonate of zinc and carbonate of ammonia. 8. A solution of the double tartrate of zinc, and of potash, soda, or ammonia. (To one thousand parts of the solution of tartrate of zinc, indicating three degrees on the salinometer, thirty parts of hydrochlorate of ammonia, and eighty parts of hydrochloric acid must be added). 9. A solution of citrate of zinc rendered soluble by an excess of citric acid. 10. A solution of tartrate of zinc in potash or soda. With each of the above solutions an analogous solution of copper must be mixed in the proportion suitable for obtaining the required depth of color."

Beside the ordinary electro-metallurgical operations, the public are from time to time told through the press that the process has been applied to the extraction of metals from their ores, but on examination the statement is invariably found to be incorrect, the metal being in all cases separated from the ore by means of an acid or acids, and the electro-metallurgical operations not applied till after this separation takes place; so that its application is altogether apart from the extraction of the metal from the ore. Such an application for common metals is commercially absurd; and nothing can exhibit the want of practical application so much as some of the patents taken out for this object. The greater number of these patents are intended for copper ores, upon which we will offer a few remarks. It will be seen from the principles of deposition, that allowing the copper was all in solution to be deposited by a battery, the cheapest form known will give the loss of one ton of zinc and sulphuric acid to get one ton of copper, which would be upward of £20 for the materials destroyed, while a ton of copper may be smelted by the ordinary process for half the sum. We give the following extract of a patent as an illustration, not because it is worse than others, but being more definite in its methods and battery than most of these patents, and the patentee an excellent electrician.

"Mr. Andrew Crosse, of Broomfield, the electrician, has just specified his patent for improvements in the extraction of metals from their ores. The apparatus employed for this purpose consists of a wooden or earthenware vessel capable of holding from 250 to 300 quarts, at a short distance above the bottom of which is a movable platinum frame covered with a netting of platinum wire, the meshes being about one inch each way. This frame is connected to the positive pole of a Daniell's battery by a platinum wire, covered with a non-conducting material throughout those parts of it exposed to the liquid in the vessel; the negative pole of the battery being connected to a copper wire, from which is suspended by three smaller wires, in the interior of the vessel, a bowl of wood lined with sheet copper and covered with a copper wire netting. The battery in connection with the apparatus should consist of 20 pairs of plates, each in a gallon glass vessel, filled with a saturated solution of sulphate of copper, to which has been added from 1-20th to 1-10th part of sulphuric acid.

The mode of operating is as follows: The vessel is partially filled with water acidulated with sulphuric acid—230 quarts of water and 5 quarts of sulphuric acid being a convenient quantity. About 15 lbs. of the copper ore, previously calcined and reduced to powder, is then stirred into the liquid in the vessel and allowed to subside, after which the platinum frame is lowered on to the surface of the ore, and the copper lined bowl suspended in its place, when the electric current immediately begins to act; but it is preferred to allow the ore to remain four or five days in the acidulated water before applying the electric current. The liquid during the process should be kept heated even as high as the boiling point, by which the separation of the copper and its deposition in the bowl will be facilitated. The time occupied in effecting this is generally three or four days, when the whole of the copper is removed. The acid liquid and sediment which will contain any other metals that may have been present, are run out through a plug-hole in the bottom of the vessel. The sediment should be tested to ascertain if it still contains any proportion of copper; and if so, it can be mixed with fresh calcined ore and again operated on. The liquid does not require any fresh quantity of acid to be added to it during the process, and afterward it may again be similarly used.

Here we have 20 pairs of plates recommended to be used in the battery, making a destruction of 20 tons of zinc and acid for one ton of copper, and taking four days to deposit. Twenty-one tons of copper per week would be but a small quantity of copper made, compared with smelting; and at the ordinary percentage of ore to get this there will have have to be operated upon 500 tons of ore, requiring acres of tanks, heated according to specification, independent of the furnace for calcining. Having got the ore calcined and free of sulphur, it would be preferable to fuse it with carbonaceous matters and get the copper direct. Notwithstanding the commercial absurdity of all these applications and patents, still there are several ingenious adaptations worthy of the attention of the electro-metallurgist as a study in his profession.

DEPOSITION OF BRONZE.

The following solution of different metals are given by Brunel, Bisson and Gaugain as being capable of giving a deposit of bronze:

50 parts carbonate of potash.
2 parts chloride of copper.
4 parts sulphate of zinc.
25 parts nitrate of ammonia.

A bronze plate is used as the positive electrode. The deposit given by this solution has been seen by Becquerel, who mentions that it bears comparison with any ordinary bronze in appearance.* A solution of the above materials in water strikes the ear as somewhat hypothetical; that a mixed solution of copper and zinc will give, under certain conditions, a compound deposit, we know, and also that, with a quantity of other salts present, will give peculiar tints of color, a circumstance which may be obtained without a compound deposit. But the difficulty to be overcome is to proportion the deposit of different metals, so that we make up a solution and battery that will deposit either Muntz's yellow metal, Stirling's yellow metal, gun metal or common brass, at pleasure; and that we may be able to produce compounds that are constant and unvarying, so that, for example, we could deposit silver or gold of the standard quality, all which, notwithstanding the many statements that have been made in print, have yet to be discovered.

*Progress of General Science, Vol. II.

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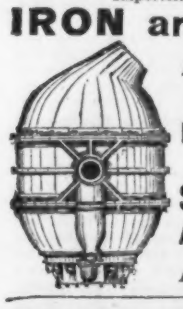
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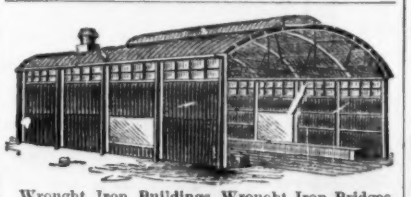
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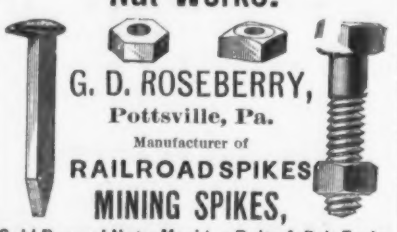

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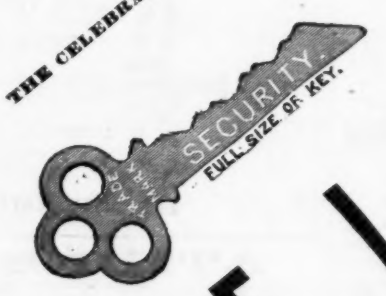

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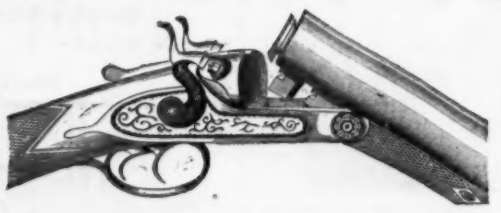

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New Patents.

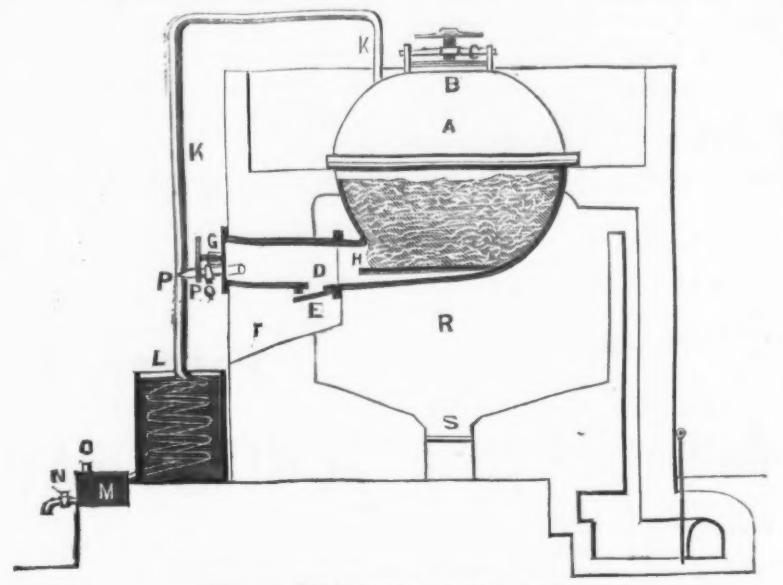
We take from the records of the Patent Office at Washington the following specifications of certain patents lately issued, which will be found interesting:

IMPROVEMENT IN REMOVING TIN FROM TIN SCRAPS.

Specification forming part of Letters Patent No. 154,178, dated August 18, 1874, issued to Henry William Hauberg, of London, England.

This invention relates to a new and improved mode of separating tin from scraps and cuttings of tinned or terned plates by means of vapors of mercury, the said vapors being generated either in the same vessel which contains the cuttings or scraps to be operated upon, or they may be injected into the said vessel.

It consists of a retort having a false bottom and a neck, within which is located a valve for discharging the melted tin in molds or other suitable receptacles, the scraps, such as cuttings of tin or terne plates, being heated in the retort, in the presence of mercury, by a suitable furnace, to a temperature sufficient to melt the tin and volatilize the mercury, and thus form with the tin and the scraps an amalgam, which descends to the bottom of the retort, where it



APPARATUS FOR REMOVING TIN FROM SCRAPS.

is decomposed, leaving the tin, at the bottom of the retort, prepared to be discharged into molds. The invention also consists in a safety pipe or tube, which is made to communicate with the retort at different points, for conducting the vapors of mercury into a worm for a further utilization in the retort, as hereinafter specified.

The accompanying drawing shows a sectional elevation of the apparatus.

A is a large retort, having at B an opening closed by means of a luted lid, C. The neck of the said retort is hollowed out at D, and at the bottom of this hollow is a small aperture closed by means of a luted valve, E. The end of the said neck of the aforsaid retort is also closed by a luted cover, G, and a false bottom, H, is provided inside the said retort. At the top of the aforsaid retort, and near the opening B, is fixed a bent tube, K, the said tube terminating by a condensing-worm, L. This worm is fixed to a reservoir, M, having a tap, N, by means of which its contents can be emptied. An opening, O, is also provided in the said reservoir, to which may be affixed a safety valve or plug. A tube, P, provided with a tap, Q, joins the neck of the retort to the tube K at P'. The retort is inclosed in a furnace, R, the grate whereof is at S, and the masonry of the retort is cut out at T, so as to leave a hollow part underneath the valve E.

The retort having been brought to a suitable temperature, so as to melt the tin and volatilize the mercury, introduce into the said retort, through the opening B, the scraps of tinned or terne plates to be operated upon. Now pour into the said retort a certain quantity of mercury, and lute the lid C. The mercury is then transformed into vapors, and the said vapors, coming in contact with the tin on the scraps or plates, forms with it an amalgam. This amalgam falls to the bottom of the retort, and is there decomposed, the tin remaining at the bottom, and the vapors of mercury forming themselves again to act a second time on the tin scraps or plates. This fresh amalgam again falls to the bottom of the retort, acts as before, and so on until all the tin has been removed from the scraps or plates in the retort, after which the tin will be found to have collected in the hollow part D of the neck of the retort, the said retort containing only bare iron scraps and vapors of mercury. The valve Q is now opened, and the vapors of mercury allowed to escape through the pipe P, condense in the worm L, and collect in a liquid state in the reservoir M, from which it may be drawn off for future operations.

When the vapors of mercury have all condensed from the retort the valve E is opened, and the melted tin allowed to run into molds, and cast into ingots. The lid G is then removed, and the scraps of iron raked out of the retort by means of hooks or other suitable instruments. The bent tube K may be considered as a safety tube, through which the vapors of mercury can escape should there at any time be too great a pressure, but they will soon condense therein, and fall again into the retort. Should, however, some of the mercury find its way to the bent part of the said tube, it will then fall down into the reservoir M and join the main body of the mercury.

Claim—1. In an apparatus for separating tin from scraps and cuttings of tinned or terne plates, a retort, A, having a false bottom, H, and a neck, D, with a valve located therein for discharging the melted tin into molds or other receptacles.

2. In combination with the retort A, the safety tube K, leading from the reservoir M, and communicating with the retort at different points for discharging the vapors of mercury into the worm L for further utilization, substantially as described.

3. A valve arranged in the neck of the retort for discharging the melted tin into molds, substantially as described.

4. The within-described process of separating or removing the tin from scrap, such as cuttings of tin or terne plates, the same consisting in heating the scraps in a retort, in the presence of mercury, by a furnace heated to a temperature sufficient to melt the tin and volatilize the mercury, the amalgam formed being decomposed, leaving the tin at the bottom of the retort to be discharged therefrom, substantially as set forth.

The Shrinking Process and the Labor Problem.

At a meeting of locomotive engineers, held in Chicago on the 24th ultimo, the following preamble and resolution was passed:

Whereas, It has come to our knowledge through the daily papers that various railway managers have in contemplation a reduction of the pay of engineers,

Resolved, That we, the locomotive engineers, representing various roads in the State of Illinois, unalterably protest against any reduction of our wages, believing that the present system of paying the engineers is in itself a sufficient reduction, and we look forward to the time when the system now in vogue on many roads—namely, of paying engineers by the trip—will be abolished, as it is not a just method of paying them.

It is somewhat singular that a body of men who are rather noted for practical good sense should, at a juncture like the present, seem to fly in the face of a logic that is impregnable. No man, or set of men, who will think calmly, can fail to recognize the fact that we are in the midst of a shrinking process that is inevitable. For some years past we have existed in a condition of inflation that was most unnatural. It was the result of a stimulation born of necessity, and which could not endure after the circumstance which gave it birth had passed away. It is true that the bubble originating with the late war has not yet been entirely obliterated, and this is to be accounted for on the principle that a stream of water continues to be muddy until the *debris* that has been washed into it has had time either to settle or float away to the ocean.

There can be no substantial check to the shrinking operation now in process. A return to specie payments may be postponed for yet an indefinite time, but the natural law of society will as surely force a greater equalization of values as that death follows life. The products of the soil have already felt the power of this law, and the railway interest, so closely allied thereto, and so much dependent on the moving of these products, is now trembling between the urgency for lower rates on the one hand and the cupidity of share and bondholders on the other. It is not difficult to determine the result of this tremor. The demand for lower prices must be met; and to do this managers must fall back upon the men who constitute the whole working force of the transportation business. Engineers—train men of all descriptions—officers, clerks, share and bondholders are but co-partners in the railway enterprise of the country, and if the business will no longer afford the same profits it did a few years since, they must all yield to the demands of an irresistible logic and live upon less money than formerly.

We have quoted the action of the engineers at Chicago as an illustration of the general temper of workingmen of all classes and in all parts of the country, and to show how unreasoning these persons are, we recur to the shrinkage in the price of iron as developed by the rates ruling therefor from January, 1873, to October of the present year. In January, 1873, the price of gray forge pig iron at Pittsburgh was $40 per ton; in July of the same year, $36; January, 1875, $31; and in October, 1874, $25·50. Is it of any use for men to "resolve" against the existence of such *facts* as are here disclosed? Is it not very much like an attempt to whistle down the wind, or to call spirits from the eighty deep, when we affect to set ourselves up against a condition of affairs that is so rigorous? If there is but a single step from the sublime to the ridiculous, it would seem that the "working people" of our country are about to take that step in the vain and imbecile effort to control a destiny of facts that is quite as immoveable as the Alpine hills.

Railway managers and employers in all relations of life must act in disregard of the threats or strikes of employes. There is no other help for them. Nature abhors a vacuum, and the space that has bewildered us within the shells of an inflated bubble since the first years of the war, must be filled by a solidity which will procure and secure permanent prosperity. The shrinkage of so called values is simply a "manifest destiny." Let all, then, accept the situation as cheerfully as possible, and make the best possible use of it.—*Phila. Mining Journal.*

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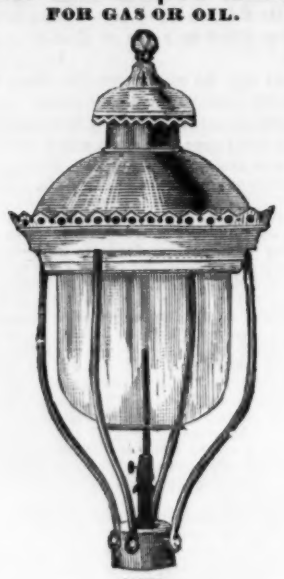

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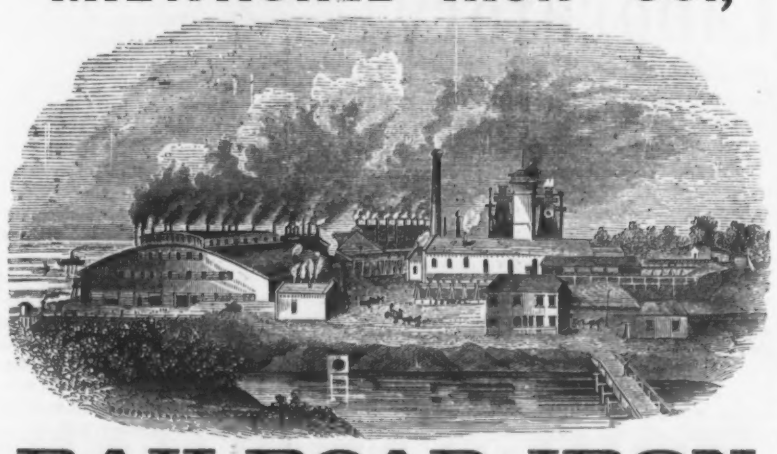

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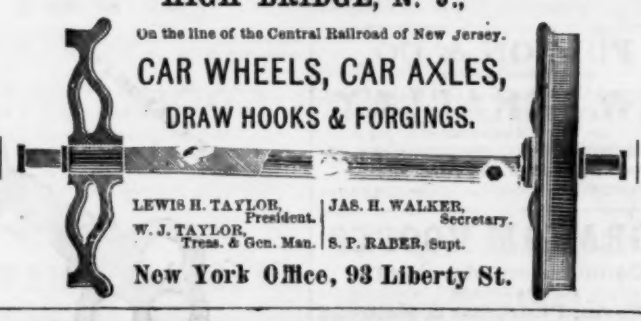

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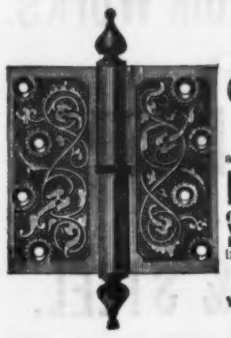

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The Iron and Iron Ore Interests of New Jersey—The Past and Present Times Reviewed.

BY A CITIZEN OF NEW JERSEY.

PART II.

The early history of the iron mines and iron works of New Jersey, with their successes and failures, their bright and their dark periods, would no doubt prove very interesting, not only to those now living, but to those, also, who will succeed the present generation. It is to be regretted very much that no better data has been preserved, for it would serve to show the progress made in the art of iron making and mode of iron ore mining, as well as the increased make of iron in New Jersey, for a period extending over 160 years in mining, and over 130 years in smelting ores, and also assist in showing the increased consumption of iron in the United States for the same period.

I think it pretty safe to assert that New Jersey furnished about one-sixth of all the pig and bar iron made in the Colonies from 1740 to 1776, and that at the beginning of the Revolutionary War, the United Colonies, then having a population of about 3,000,000, were not using over 50,000 tons of iron of all kinds, and for all purposes, per annum, a considerable portion of which was imported iron. This would give an annual consumption per capita of about 33 lbs., while in 1872 and 1873 the country used about 4,000,000 tons per year, or not far from 200 lbs. per capita, estimating our population at 40,000,000.

I referred in my first article to the fact that these early times were hard times for the farmers and laborers, little money, &c., to which I add proof by quoting an old order and receipt for the payment, &c., 118 years ago, viz.:

OXFORD FURNACE, Oct 14th 1756

Mr Shackleton desires you'd let the Bearer John Jarratt, have the two pair Leather Breeches, he left to be made, and charge the same to the companys acc't.

Yours &c

TO MR BAMPER OR WM EDMONDS at Bethlehem. THOS CAINE

Endorsed on the back of order was the following:

Received the 1. March 1757 The sum of Seven Shillings Two pence by making Two pair of new Breeches on acc't of Mr Robinson & Comp'y Iron Works at Oxford Beeing the contents of the within order. I say rec'd by me

his

THOS x JARRATT

£—. 7. 2. mark

It will be observed that Bethlehem is some 12 miles above Easton, Pa., and 28 miles from Oxford, a good way to go for breeches, yet this was four years before 1760, the time when Benj. Franklin and other commissioners, appointed by the Pennsylvania government, met at Easton to treat with the Indians of the regions above there. Also, a letter from one of the forgemen, on the Musconetcong River, in Warren county, to the proprietor of the Durham furnace, Mr. Backhouse, showing his trade of stove plates and bar iron for fat cattle, &c., viz.:

GREENWICH FORGE Oct 18th 1780

DR SIR Being in very grate want of forge man I have Persuaded Burns to go to work for 3 or 4 weeks thats if you can get some Body else to Do your work I wanted him To go to work this morning as Cuff is sick But he would not consent until he went over to see you as he said he knowd you expec'd him. I am now at work my self though my wife is very sick in Bed But I am in hopes will soon be Better * * * and would Be glad to see nobly over if convenint Mr Yeamans has Been up and purchased the cattle of the man at the *Meravenon Mills the Large p'r of oxen he has agreed to give pound for pound in Bar Iron and he Bout 2 other p'r at three pence pr lb. and to be p'd in Stoves at £23 pr Ton, or Bar Iron at 30/ pr cwt. the 2 Larger oxen he says are the finest he ever seen in his life. I thinck to send the Sliting Mill over on friday morning, would Be very glad if it would suit you to send us that Barrel of Tar, and send for another on our ac't, and keep it.

I am sir your humblest

SAM'L WILLIAMS.

To Richard Backhouse Esq, Durham Furnace.

Also, another letter from another forgeman on the same river, four miles above, which, with the foregoing, serves to carry us back to the early times of our country.

BLOOMSBURY May 18th 1787

DEAR SIR I have sent by George Beaty 500 cwt Iron containg 20 bars, as the Hammer Wheel gave way yesterday prevents my sending the half tun as propos'd Shall try hard to send you Half atun next week As neatly drawn according to your Directions as any upon this creek, as my Real Intention is to be puntual will try hard to get before hand for piggs with money & Barr Iron Together, before it be so long

I am sir your very Hbl ser't

ROBT. JOHNSTON.

To Richard Backhouse Esq, Durham Furnace.

SIR Please to send p George Beaty one Tun piggs on a't of Your Hble Servt

ROBT. JOHNSTON.

May 18th, 1787.

Richard Backhouse Esq, Durham Furnace.

Rec'd May 18, 1787 of Richard Backhouse one Ton Pig mettle for Robert Johnston

GEORGE BEATTY.

The writer is indebted to John Jordan, Jr., Esq., member of the Pennsylvania Historical Society, for the foregoing orders, receipts and letters.

The Durham furnace, now owned by Messrs. Cooper & Hewitt, of New York, was built a few years prior to the Oxford, and, as it was just across the Delaware River from Warren county, N. J., it had a share of the trade with the New Jersey forges in bartering its pig iron for bar iron. The boats, then and since called "Durham Boats," took their name from having been first used for this furnace, and were really beautifully modeled craft; sharp at either end, about 56 feet long, 7 feet wide and 3 feet 6 inches deep, round bottom, capable of carrying about 15 tons of pig or bars from Durham, or from "Foul Rift," 25 miles further up the river, to Philadelphia. It was at the foot of this "Foul Rift," where these boats were laden with the products of Oxford Furnace, up the Pequest Valley, 8 miles distant, and Andover Furnace and forges, 28 miles distant, at the north end of the Pequest Valley, for Philadelphia market. This latter furnace (Andover) also occupies an important part in the colonial history of New Jersey, was built A. D. 1763, and for the uses made of its iron during the Revolutionary War, I copy from Prof. Cook's Geology of New Jersey, the following highly interesting items concerning its early history, extracts from Continental Congress records, &c. The lands upon which it was built were entered by William Penn and Thomas Penn, of Pennsylvania, to the extent of 11,000 acres, and passed afterward into the hands of Allen and Turner, who at the breaking out of the war were loyalists, with their other partner, Mr. Chew.

"During the Revolutionary war, in 1778, the Andover mines, furnace and forges were taken possession of by the Continental Congress, and the army supplied with iron and steel thence." After the war the works fell into ruin and were abandoned until 1847, when the mines were bought by Messrs. Cooper & Hewitt, of New York, who mined and sent away from this property about 200,000 tons of ore, which produced a remarkably fine quality of iron, gaining for its makers a high reputation. The annexed quotations show in what esteem it was held by the government in 1778:

[*Journals of Congress, 15th January*, 1778.]

The Board of War brought in a report, whereupon—

Resolved, That the Board of War be authorized to direct Col. Flower to make a contract with Mr. Whitehead Humphries, on the terms of the former agreement, or such other as Col. Flower shall deem equitable, for making a quantity of steel, for the supply of the continental artificiers and works with that necessary article, and as the iron made at the Andover Works only will, with certainty, answer the purpose of making steel; that Col. Flower be directed to apply to the government of New Jersey, to put a proper person in possession of those works (the same belonging to persons who adhere to the enemies of these States), upon such terms as the government of the State of New Jersey shall think proper; and that Col. Flower contract with the said person for such quantity of iron as he shall think the services requires.

Resolved, That a letter be written by the Board of War to the Governor and Council of the State of New Jersey, setting forth the peculiarity of the demand for these works, being the only proper means for procuring iron for steel, an article without which the services must irreparably suffer; and that the said governor and council be desired to take such means as they shall think most proper for putting the said works in blast, and obtaining a supply of iron without delay.

[*From the Board of War to the Governor*].

WAR OFFICE, May 25th, 1778.

The Board not having thought proper to agree with Col. John Patton, for the carrying on the Andover Iron Works, have instructed Col. Flower to apply to the government of your State, and procure the possession of the works for Col. Thomas Maybury, with whom the terms of the contract are settled, on condition of his getting the possession agreeably to the resolution of Congress. As we find it absolutely necessary to put these works in blast, the Board beg the favor of your Excellency to assist Col. Flower or Col. Maybury in the business; they will necessarily have to have such, relative to the works with the government of your State.

I have the honor to be, with great esteem, your very obedient servant.

By order of the Board,

RICHARD PETERS.

His Excellency, Gov. LIVINGSTON.

[*From Col. Flower to Gov. Livingston*].

LEBANON, May 28, 1778.

SIR: Your Excellency will see by the Honorable Board of War and Ordinance, that they have not thought proper to agree with Col. Patton for the carrying on the Andover Iron Works, and have directed me to apply to the government of your State and procure the possession of the works, to wit: the furnace and forges, for Col. Thomas Maybury, with whom I have made contract for the iron to be made at the said works to be converted into steel, agreeably to the resolutions of the Honorable Congress of the 15th of January last; since Col. Patton could not get possession of these works, with the consent of the owners, two of them being with the enemy in Philadelphia; and Mr. Chew, whom Mr. Whitehead Humphrey's and myself waited on, who is another owner, refused to have anything to do with it, as he was only a part owner, but advised me to send in a flag to Philadelphia, in order to treat with Messrs. Allen & Turner on the terms of the lease, agreeably to the resolution of the Honorable House of Assembly of your State, on the 13th of March last; which advice of Mr. Chew I considered as an insult, as he knew such a step was impracticable.

I therefore, in behalf of the United States of North America, beg leave to solicit your Excellency's assistance in these premises, in order to have Col. Maybury put in possession of the Andover Works as soon as possible. As your honors were pleased to assure us that if the present owners of the works refused to let them for the use of the public, the Legislature would then take the necessary steps for putting them in the possession of a proper person, in order to have them carried on for the purpose before mentioned.

I hope the Legislature will approve of Col. Maybury, and give him such assistance as will enable him to perform his contract, and that your Excellency will use your influence to accomplish this very essential and important business.

I have the honor to be your Excellency's most obedient, obliged, very humble servant,

BENJAMIN FLOWER,

COL. ADG. C. G. M.

His Excellency, Gov. LIVINGSTON.

The foregoing letters serve to show how history repeats itself in all countries and in all ages; by what our government did in seizing the iron works at Chattanooga and other important points in the late civil war. How much fault was found with our government for it, we who are living all know.

Very little progress was made in the art of making pig iron, either in New Jersey or in the United States, for the period of sixty years from 1776. The long war of the revolution, its wasting effects on the energies and resources of the young republic—the conflicting opinions of the different thinkers of the period—the great want of transportation facilities—the comparatively little knowledge of the vast resources of the country in its iron and other minerals, coupled with the fact of the long continued use of English, Swede and Norway Iron by large numbers of shipbuilders and blacksmiths throughout the country, who came to think no other varieties could be so good, made it very difficult for the American iron maker to introduce his brand into a market against the foreign iron. In illustration of the prejudice in favor of, and the tenacity with which consumers clung to, old brands of iron, as against any innovations by new names, and the value of brands, trade marks and reputation, I will cite the following story, related to me by an old iron master: Some fifty years ago, in an Eastern town, a country merchant kept, as was then usual, in connection with his dry goods, groceries, hardware, crockery and liquors, a good assortment of iron—wagon and cast tire in particular. He had had for a long time a customer living in one of the back towns who regularly came, as often as every one or two years, to buy iron for his shop. He came again that autumn, and after selecting his assortment of horse shoe, cast tire and other iron, and starting for his home, he suddenly turned around and came back, and said he believed he would take another set of tire along with him. The merchant asked him what led him to this conclusion. His reply was as follows: "I'm getting to be an old man. I've used Swede's iron for more than forty years, and I began to think Mr. Swede must be getting old, too, and might die soon, and then I wouldn't get the same iron; so I thought I'd better take it along now, while I could get it." It may not be out of place here to give the hint to our American iron makers to look well to their quality, as it has had very much to do with the success of many establishments in this country, and will always have, to which I may again refer before closing this series of articles.

The same sized blast furnaces were maintained—generally about 30 ft. high, and from 6 ft. to 7 ft. 6 in. in diameter of boshes, their weekly yield varying according to the size of the furnace and the quality of ores used, from 16 to 28 tons per week.

This period of sixty years brings us down to 1836, when, according to the best statistics that could be gathered, the annual national product had reached about 185,000 tons. It will not be forgotten, however, that our importations at this latter period had rapidly increased, and that they probably, in value, exceeded our own make, and that all the iron used for railroads at that period was foreign, as well as for several years thereafter.

This period (1836), however, brings us down to the time when nearly every forge in New Jersey had ceased using pig iron, and had established "blooming" fires, and was using iron ores direct, obtainable within easy reach. Quite a number of small rolling mills in various parts of the State had been running successfully for several years previous, producing many smaller and more desirable shapes of iron for the market, using as a fuel either coke or foreign coals, the New Jersey Iron Company, at Boonton, New Jersey, first using anthracite coal for puddling about 1838-9.

At this period (1836), and for several years previous, many attempts had been made to utilize the waste gases, both from the tymp and tunnel head of blast furnaces. Mr. William Henry, of Oxford, New Jersey, used a nest of small circular pipes in front of the tymp with partial success in 1833-'34, for heating the blast, and in 1835 placed a nest or oven of some 28 upright pipes, about 5 ft. high and 5 in. diameter at the tunnel head, which would heat the air to 400° Fahr. This plan made a saving of over 30 per cent. in fuel, and increased the weekly product nearly as much more. This set of pipes was replaced in a year or two after by a set nearly 10 ft. high and of greater heating capacity, and was all that could then be desired for smelting with charcoal.

After 1836 the charcoal furnaces generally began to adopt the hot blast, with almost every variety of pattern, and New Jersey then had the following named furnaces in blast, viz.: Oxford, Boonton, Franklin, Hamburgh, Wynocke, Clinton, Pompton and Ringwood, in the northern part of the State, and two or three in the southern part, with some 30 forges using ores and producing blooms, bar iron and anchors. Including the rolling mills at Boonton, Pompton, Dover, Powerville, Rockaway and Bridgeton, New Jersey's annual share of the national production had by this time (1836), reached about 9500 tons of pig iron, and about 14,000 tons of wrought iron of all the varieties.

As the tariff of 1828 (fixed with a scale sliding against the manufacturer each year for 10 years) neared 1838-39, the falling off in the make of all kinds of iron was very perceptible, as well, also, as were the shipments of magnetic iron ores from New Jersey to Pennsylvania.

The ironmaster, always an important element in progressive society, was fairly floundering in all the States in the year 1838, 1839, 1840 and 1841. But few weathered the storm of 1837, and the lowering tariff of these years, and for a while only Oxford, Boonton and one or two other furnaces kept running in New Jersey.

The partial and successful use of anthracite coal, mixed with charcoal, by the Messrs. Scranton, at Oxford, in 1839, in their hot blast furnace, with its successful use in puddling iron at Boonton and a few other places, and with reports favorable from Wales of its successful use there, gave new and encouraging features to the iron makers' hopes and plans for cheapening the product to meet foreign competition, and, as in 1839, '40 and '41, new furnaces were projected and built by Edwin Post, Esq., at Stanhope, N. J., by David Thomas, Esq., at Catasauqua, Pa., by Burd Patterson, Esq., at Pottsville, Pa., and by Messrs. Scranton, Grant & Co., at Scranton, Pa., producing from 40 to 70 tons each per week, new supplies of iron ore were sought for, so that by the time the tariff of 1842 began to be felt, many old mines in New Jersey had been re-opened, and new ones discovered to meet the demands of the trade.

(To be Continued).

* Note. The Moravian Mill was at Hope, Warren county, near Sussex county, where the Moravians had a settlement.

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The **Triangular Wire Ring, manufactured only by us,** is the only wire ring that can be inserted in the hog's nose with one grip on the **Ringer,** and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.

For Sale by the Leading Jobbing Hardware Houses of New York, Philadelphia, Baltimore, Cleveland, Columbus, Cincinnati, Dayt Inna poli Lafayette, Chicago, Milwaukee, Burlington, Davenport, St. Louis and San Francisco.

SOMETHING NEW.

We shall this present season make a **Heavy Tinned Wire Ring** that will not rust in the hog's nose. The strongest and best ring in the market.

Prices.

Ringers, retail	$1 00
" per doz	6 00
Rings per box (100) coppered wire	50
" per doz boxes (1200) "	3 00
" per box (100) tinned wire	60
" per doz. boxes (1200) tinned wire	4 00
Tongs or Holders retail	1 25
" " per doz	9 00

The coppered wire ring will be sent unless otherwise ordered.

Samples by mail postpaid on receipt of retail price.

Goods sent C. O. D. with privilege of examination before paying charges.

Net prices in quantities, circulars and posters mailed free.

Our advertisements are now inserted in over 1800 newspapers, published in every State of the Union, so that dealers will find a large demand created for our goods.

THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent *Increment Cut*, an invention owned and controled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformityof machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand or upwards of 500 dozen per day. We employ no *regular Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
Providence, R. I.

USE THE BEST.

Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

FILES AND RASPS.

XTRA QUALITY,
MADE FROM THE BEST
IMPORTED STEEL
BY THE
Auburn File Works,
AUBURN, N. Y.

JOHN ROTHERY'S Celebrated Hand-Cut FILES,

Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.

W. F. SHATTUCK & CO.,

113 Chambers and 95 Reade Street, New York.

MANUFACTURERS OF AMERICAN HARDWARE.

Cees & Taft's Pat. Wrenches.
Axe, Pick, Sledge & Hammer Handles.
Hatchet, Auger, Chisel & File Handles,
Mallets, Pat. Boot Jacks.
Gimlets and Gimlet Bits.
Augers and Auger Bits.
Cocoa Nut Dippers.
Mouse Traps. Wire Selves.
Scale Beams.
Patent Tap Borers.
Tool Chests.
Climax Horse Collars.
Brandage Horse Nails.
Maguire's Wr't Iron Goods.
Shattuck's Platform Counter Scales.
Yaw's Cow Bells.
Axes, Picks and Hatchets.
Hammers. Crow Bars.
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Boring Machines.
Cast Iron Hatchets.
Coffee Mills.
Star Steel Spoons.
Stocks and Dies.

DEAN'S New Patent (1873)
Screening Scoop SHOVEL

For Coal, Coke and Coal Ashes, and other Substances.

The largest frames are 12 by 18 inches, with seven bars, and are made of the Best Malleable Iron. They are, or can be, wired between bars by an arrangement of holes a quarter of an inch apart., by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—All New York Gas Companies and Hotels.

☞ Smaller sizes on hand. Please address orders to

A. SEE & SON,
N. Y. Shovel Works,
1358 Broadway, N. Y.

Price: Largest size $30 per doz., and upwards, according to size of spaces.

Clement & Hawkes Mfg. Co.,
Manufacturers of
SHOVELS,
Planters' Hoes, Trowels and Machinery.
Northampton, Mass.
☞ Send for Circular and Price List.

Schweitzer Mfg. Co.,
57 Reade St., N. Y.
IMPORTERS & JOBBERS.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

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SHEFFIELD.

FILES AND HORSE RASPS,

And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,
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EVERY FILE WARRANTED.
Equal to the
BEST.

Western Files. Western Files.

Works, Beaver Falls, Pa. Office, 96 Chambers St., N.Y.

Western Files. Western Files.

LARGEST CAPACITY
Of any File Works in the World.

In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class file in the market. A trial will confirm their reputation.

PENNSYLVANIA FILE WORKS.

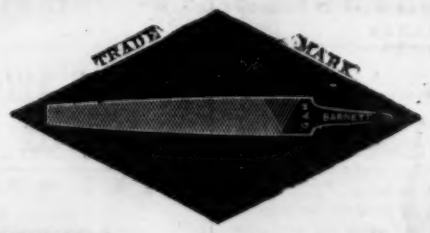
Illustrated Catalogue and Price List

Sent to the Trade on application.

McCAFFREY & BROTHER,
Manufacturers of FIRST QUALITY FILES and RASPS ONLY,
Nos. 1732, 1734 & 1736 North Fourth St., Philadelphia, Pa.

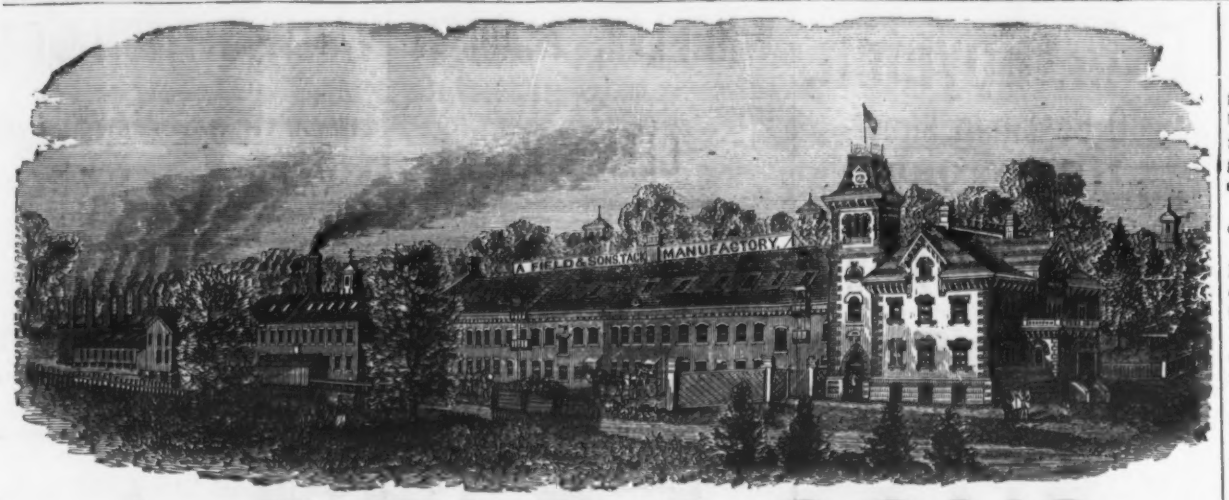
Black Diamond File Works.

Send for Illustrated Price List.



Send for Illustrated Price List.

G. & H. BARNETT, 39, 41 & 43 Richmond St. Phila.
LINFORTH, KELLOGG & CO.,
Sole Agents for the Pacific Coast, 3 & 5 Front St., San Francisco, Cal



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TAUNTON, MASS., Manufacturers of

Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

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Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

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Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks,
Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

☞ Any variations from the regular size or shape of the above named goods made from samples, to order.

Hopkins & Dickinson Manufacturing Co.,

FINE METAL WORKERS,

69 Duane Street, N. Y. Works, Darlington, N. J.

Hand Made Locks and Real Bronze Hardware.

NEW AND ARTISTIC DESIGNS FOR

Private Residences, Banks, Churches and Public Buildings.

Iron & Brass Wood Screws.

Full assortment constantly on hand.

ALFRED FIELD & CO.,

Importers,

93 Chambers Street, N. Y.

PECK & SNYDER'S "American Club Skates."

FOR LADIES, GENTLEMEN OR BOYS.

We manufacture the following sizes, which, in ordering, must correspond with the length of the shoe worn: 8—8½—9—9½—10—10½—11—11½ inches. These Skates are made of the best material and in the best manner, requiring no Heel-Plates or Key. They are conceded by experts to be the most desirable skate now in market. Adjust the clamps A and B to the size of the foot by turning the thumb-screw D; when once adjusted, close the lever C, and the skate becomes securely locked to the foot.

	Full Polished.	Nickel Plated.
Price, with Blued Foot-Plate, per Pair..	$3 75	$5 00 $6 25
The Clipper Club Skates, per Pair	2 00	3 25 4 50

We are also manufacturers of Straps and Skate Trimmings of every description.

Agents for Winslow's Wood Top Skates. Trade catalogue with discounts on application, Address

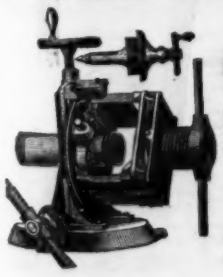
PECK & SNYDER, 126 Nassau Street, New York.

Anti-Friction Metal,

INGOT BRASS, BRASS CASTINGS.

Du Plaine & Co.,

1303 & 1305 Buttonwood St., PHILADELPHIA.



PORTABLE PIPE AND BOLT

Threader and Cutter

Cuts off and threads from ⅛ inch to 3 inch Pipes and Bars. Also taps Nuts and Centers work ready for Lathe. One man can thread 3 inch Pipe with ease with Dies furnished with machine. No Pipe splitting; no bevel inside or out. Requires no skilled labor.

A Full Set of Sockets and Lengths for Making Nipples Furnished with each Machine.

ANY SOLID DIE CAN BE USED IN THIS MACHINE.

Send for Circular.

EMPIRE MFG. CO., 18 William Street, N. Y.

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Filter

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PORCELAIN LINED

COOLER.

Acknowledged the only Complete Filter and Cooler in the world.

Hardware, House-furnishing and Crockery dealers can find no more salable article, as this Filter is perfect in its work of purifying water of every kind, attractive in appearance, &c., &c.

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JOHN C. JEWETT & SONS, Buffalo, N. Y.

OTIS PASSENGER —AND— FREIGHT ELEVATORS

For HOTELS, OFFICE BUILDINGS, STORES, WAREHOUSES, FACTORIES, MINES, BLAST FURNACES, &c.

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SOLE MANUFACTURERS,

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Nickel Plating Co.

Works, 133 & 135 W. 25th Street,

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ELECTRO-NICKEL PLATING

On all Metallic Articles finished in the best manner.

Office, 615 Jayne Street.

BUSINESS ITEMS.

PENNSYLVANIA.

The Johnstown *Tribune* says: The shook firm of Nutter, Cunningham & Co., Conemaugh borough, last week received an order from Cuba for 250,000 shook, and employment is thus guaranteed to the men working for the firm for some time to come.

The Lochiel Iron Works, Harrisburg, started on full time on Monday, 23d ult.

The Lewistown *Democrat* says the Glamorgan Furnace Company has stopped all their mining operations, and report says the furnace now in blast will soon be blown out. At Logan Iron Works things are also dragging heavily, most of the works being in operation only half the time.

Clara Furnace, New Castle, was blown out on the 18th ult. Weekly capacity, 350 tons.

Griffith & Banks have completed an iron and brass foundry at Mont Clare.

The Catasauqua *Dispatch* of the 21st ult. says: No. 5 furnace of the Crane Iron Works made 342½ tons of iron last week, of which 291 tons were No. 1 extra quality. The previous week it yielded 316 tons of foundry iron. The present week it is expected over 300 tons of No. 1 extra will be forthcoming. This is a 17½ feet bosh furnace, and the yield of 291 tons of No. 1 extra iron in one week is a remarkable product, and shows that the management is in good hands.

Two thousand coal cars are to be built at the Packerton shops during the coming winter—an average of 96 weekly.

The Franklin Steam Boiler Works were started in 1872 in a shop 24x30 feet, and with one employe. The works now give employment to 38 hands, and occupy more than twice the room. They have in use two screw cutting machines, two power punches, a drill press and a large bending machine. Their orders for iron tankage alone amount to something like $15,000 worth.

A new frame building is being erected on the site of the recently burned copper works at Phœnixville. The structure will be 130x40 feet, and slated. It will contain two reducing furnaces and one refinery, and will be ready for smelting by the middle of this month. The ores to be used will come from New Mexico, Texas, Missouri, Virginia, and even from Cuba.

MASSACHUSETTS.

James Hunter & Son, of North Adams, manufacture castings and machinery in great variety, making a specialty at present of their celebrated Rotary Fulling Mill. Their machine shop is 94x40 feet, three stories; foundry, 50x100 feet. Beside these are other buildings, covering in all an acre of ground. They give constant employment to 40 hands. This firm has been established 16 years; but James Hunter started the business in North Adams 25 years ago.

Nearly two hundred fire departments in the United States have adopted the Babcock self-acting fire extinguisher, and it has been found a most valuable auxiliary to city fire departments. These useful appliances are manufactured by the New England Fire Extinguisher Company, Northampton.

At the fair of the State Agricultural Society, recently held at St. Louis, Mo., we understand there was awarded for Globe horse shoe nails, manufactured by the Globe Nail Company, of Boston, the highest premium ever given for this class of goods—a silver medal. This company are hard at work on improvements, by which they hope soon to double their production, and be enabled to meet the demand for their goods more promptly than during the past year.

CONNECTICUT.

The Farrel Foundry and Machine Company, of Ansonia, are laying the foundation for an addition to the south end of their works, to be built in the spring. Wallace & Sons, of Ansonia, are also building an extension to their rolling mill.

NEW HAMPSHIRE.

Geo. E. Fifield, of South Newmarket, has built several locomotives for use upon the wooden railways in the lumber regions of Georgia. A 12-ton locomotive has lately been turned out to go to that State, and Mr. Fifield is now making a heavy gang mill for the same destination.

OHIO.

Akron Iron Company have been running their mill during the entire year past with a full force of hands, and have turned out a very large quantity of iron, which is principally used for machinery. In the month of October the company manufactured and sold iron of various sizes to the amount of $55,000.

J. Park Alexander, proprietor of the Diamond Fire Brick Works, at Akron, has just shipped the last car load of an order for 100,000 brick. The Cleveland branch of his works, at Newburg, will be ready to start at once, and, when completed, will be one of the largest and most complete brick works in the country.

The Niles Iron Company has commenced drilling for a gas well near their rolling mills at Niles.

The pump and rake factory built by G. Q. Freer & Co., at Orrville, and who made an assignment last July, was sold at public sale on the 19th ult. to Jacobs and Christian Brenneman.

The Girard Rolling Mill Company is in full blast, running day and night, and with orders enough ahead to keep going for some time. The mill building property is 250x265 feet, and is in excellent repair. There is in the building 16 furnaces, one 8 inch mill, one 10 inch mill, and one 18 inch mill, with all the necessary machinery to successfully run them. There is now being added, and will shortly be in operation, two bolt machines, four nut machines, three washer machines, of a new and improved pattern. The link and pin machines, lately placed in position, are doing nice work, and, no doubt, this department will grow and become an important branch of the business; the huge hammer, used for pointing the car pins, moves with lightning rapidity and is a handsome piece of machinery. In these different departments are employed about 175 men and boys.

Aultman, Miller & Co.'s Mower and Reaper Works, Akron, are employing 380 hands, and running at their full capacity.

The new rolling mill building in Ashtabula is now entirely covered, and a large amount of machinery is in place.

The Aldine Printing Press Manufactory, Canton, Ohio, is an extensive establishment. The main building covers 12,500 square feet, and is three stories in hight. To this is added two wings, each covering 2500 square feet, with three floors, the whole built of brick, and situated on a line of railway, having all the advantages for easy transportation. The total amount of space used for workshops, store houses, show rooms, etc., in this building is 67,500 square feet. They employ a 50 horse-power engine. The works are owned and conducted by B. F. Renick & Co., and have been running steadily during the past dull season with their usual number of employes.

INDIANA.

The Indiana shops of the Baltimore, Pittsburgh & Chicago road have been located four miles north of Avilla, instead of at Albion, as everybody seemed to expect.

MISSOURI.

The St. Louis Bolt and Iron Company have recently enlarged their operating capacity by the addition of three spike machines, and are now running from five to six tons of track material daily. This company have booked an order for the Austin (Texas) street railway, and the works are actively employed running the full day turn.

St. Louis has just inaugurated the enterprise of iron shipbuilding, and the shops will soon be completed for this extensive industry.

MICHIGAN.

The Carp Furnace will blow out again in the course of two or three weeks, by which time she will have exhausted her supply of charcoal. She has been running very slowly for some time, making only about 13 tons a day. She will probably remain out of blast till spring, or until there is a better demand for pig. The rolling mill furnace in this city has been doing splendid work lately, having achieved a daily product of 45 tons. So much to the credit of a manager who secures the best of skilled superintendence. The Kloman has shipped 34,411 tons over the Cleveland dock, this year, and has yet to ship 1000 tons to local furnaces. Munsing Furnace has blown out for repairs. Will go into blast again as soon as repairs are made for the winter. The Bay continues blowing one stack, making an average of 30 tons daily. Barges are to be put on the route to transport ore enough to stock the Bay and Munising Furnaces until the opening of navigation in the spring.—*Marquette Mining Journal.*

The Wyandotte Rolling Mill Company manufactured more bar and plate iron in September last than any other month since the works started, nearly 19 years ago.

CALIFORNIA.

Arrangements have been made between the Cornell Watch Company, of San Francisco, and Paul Cornell, of Chicago, whereby the machinery of Mr. Cornell's factory, in Chicago, will be forwarded thither with all convenient dispatch. The company has a capital stock of $300,000, and Mr. Cornell is one of its incorporators. The new enterprise will occupy the structure heretofore known as the Kimball carriage factory, the work of renovating which has been in progress for several weeks and is about finished. It is anticipated that at the close of January 100 men will be at work. During the infancy of the enterprise the watches manufactured will be sent to markets abroad, and any local demand cannot be satisfied.

The Napa Plow Works are busy. About 200 plows have been made there during the present season.

VIRGINIA.

At the Tredegar Iron Works, Richmond, nine puddling furnaces are working and sixteen idle. The price paid for puddling is $5·50. Many of the men about the rolls are colored, but none are employed in the puddling mill, the whites there refusing to work with them. 1600 men are employed at these works.

Perrotte's High and Low Water Indicator.

We find in *Revue Industrielle* a description of Perrotte's apparatus for indicating the hight of water in a boiler. The index is operated by a magnet inside the boiler, and does not require any piston or stuffing box. The arrangement is as follows: The rod of a metallic swimmer has a groove at its upper end, and is kept perpendicular by a guide, while, at the same time, it imparts a rotary motion to a horizontal axis. This axis has at one end a horse shoe magnet, and this is lightly pressed by a spring against the side, which is made of sheet copper. Outside of this copper wall is an armature of soft iron, which is attracted by the poles of the magnet. The armature is fastened by a pin in the center, upon which it turns, and it carries a needle which plays over a graduated plate. From this arrangement it follows that the needle cannot leave this plate to which it is firmly attached by its joint of support. Two needles may be attached if it is desirable to read on both sides of the graduated circle. This arrangement may be attached to a steam boiler in front, or to the steam dome of a boiler. It is especially adapted to use on locomotives.

The enameled index plate is divided into three parts, which are of different colors, so as to attract attention at once to the most important points in feeding a boiler, viz., low water, normal hight, too high water. An alarm whistle may be connected with it so as to be set in action by the float. The action of the float on the pointer is constant even beyond the divisions of the dial. In ordinary apparatus the float can only operate the whistle when it is suspended from it, and ceases to act just when it is most necessary to know the hight of the water.

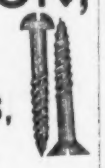
An apparatus in which the hand has a play of 6 inches, costs, in France, without whistle, 150 francs, with whistle, 170.

GEORGE GUEUTAL & SON,

39 West 4th St., New York.

IMPORTER OF

Wood Screws, Steel in Sheets,



BAND SAWS, TOOLS FOR BRAZING, &c.

Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,

MANUFACTURER OF

SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURGH, N. Y.

THE SILVER STEEL

DIAMOND CROSS-CUT SAW.

$1.50 Per Foot.

Patent Secured

PATENT HANDLES AND GAUGE INCLUDED.

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of SPEED AND EASE, is manufactured by E. C. ATKINS & CO., Indianapolis, Ind., who are the

SOLE MANUFACTURERS FOR THE UNITED STATES.

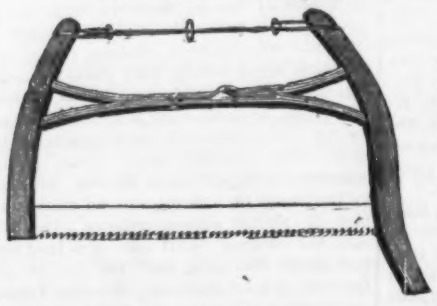
So confident are we that this is the best Cross-cut Saw in the market that we CHALLENGE THE WORLD. Orders promptly filled.

E. C. ATKINS & CO.

E. C. ATKINS. H. KNIPPENBERG. Saw Manufacturers and Repairers, Indianapolis, Ind.

Hankins' Elliptic Forked Saw Frame.

Patented June 28th, 1870.



The annexed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

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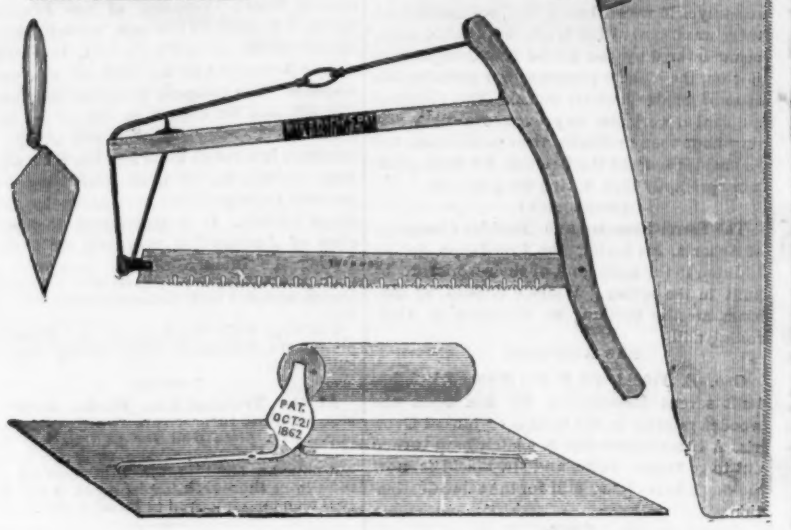

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Two Direct Cutting Edges, instead of one Scraping point.

Note extra steel and durability over the old V, outlined on M tooth.

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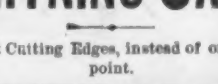

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HORSE SHOE NAILS.

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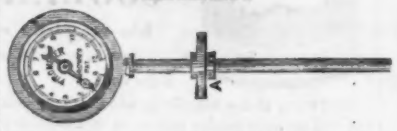

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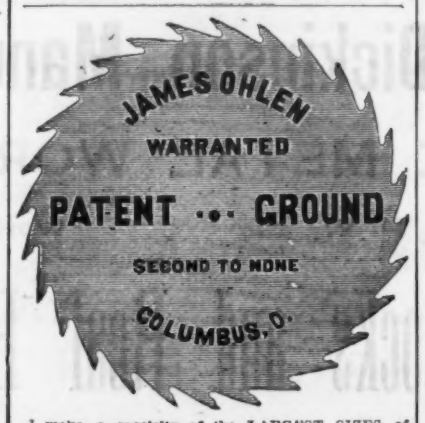

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Evenness of Temper.—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

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I am sole proprietor and manufacturer of the celebrated **"Challenge" Cross-Cut Saw.** Price Lists of all kinds of saws sent on application.

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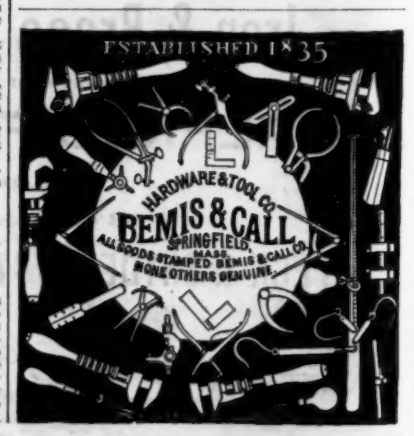
CARTERS' PATENT CARRIAGE LIFTING JACK, &c



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Angular Extension

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ANGULAR EXTENSION BORER.

Salesroom, 82 Chambers St., N. Y.

This tool can be used in any brace, at any angle, and also for straight work. Is the best and most convenient tool of its kind ever offered to the public. Eight thousand sold the first year.

Also Manufactures the Straight Extension

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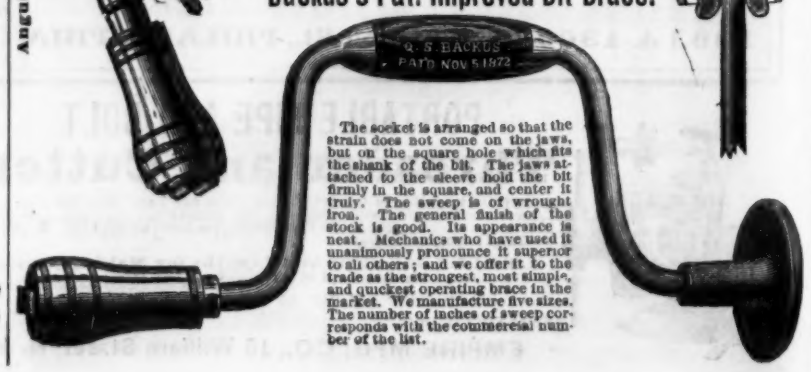

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The socket is arranged so that the strain does not come on the jaws, but on the square hole which fits the shank of the bit. The jaws attached to the sleeve hold the bit firmly in the square, and center it truly. The sweep is of wrought iron. The general finish of the stock is good. Its appearance is neat. Mechanics who have used it unanimously pronounce it superior to all others; and we offer it to the trade as the strongest, most simple, and quickest operating brace in the market. We manufacture five sizes. The number of inches of sweep corresponds with the commercial number of the list.

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The **only Knives made** that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the **Best American Knife.** We also make

NICKEL & SILVER PLATED POCKET KNIVES

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For Water, Gas and Steam,

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Also, **Fire Hydrants, Single and Double Nozzle.**

Improved Boiler Feeders, Etc.

Cor. Park Way & Sandusky Sts., ALLEGHENY, PA.

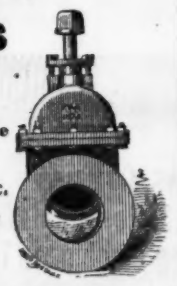

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Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

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Wood's Hot Water-Proof Table Cutlery.

Handsomest, Cheapest, most Durable Cutlery in use.

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Wholesale Cutlers.

Sole Agents for **Wm. Clauberg's Warranted Pen and Pocket Knives, Razors, Scissors, &c.**

SPECIALTIES:

Full Concaved Razors,
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Razor Hones,
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Wade & Butcher's Razors, and Cutlery in general.

AMERICAN PEN AND POCKET KNIVES,

MANUFACTURED BY *PEPPERELL,*

Aaron Burkinshaw. AB MASSACHUSETTS.

My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society; also a Medal and Diploma from the Mass. Mechanics' Ass'n Sept., 1860

Cutlery.

JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA,

AGENT FOR

George Wostenholm & Son,

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Celebrated I-XL Cutlery, Razors, &c

AGENT FOR

WALTER SPENCER & CO.,

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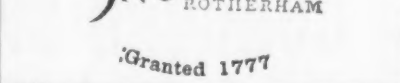
Corporate Mark.



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37 Chambers St., New York,

Agent for

F. W. HARROLD,

Hardware Commission Merchant,

BIRMINGHAM.

JOSEPH ELLIOT & SONS,

Manufacturers of Razors, Table Knives, &c.,

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CORPORATE MARK,

Joseph Rodgers & Sons'

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CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

CHARLES PEACE, Jr., Agent.

The demand for **Joseph Rodgers & Sons'** productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam Power.

To distinguish Articles of **Joseph Rodgers & Sons'** Manufacture, please to see that they bear their Corporate Mark.

Notice of Removal.

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From 54 Beekman St. to No. 101 and 103 Duane St., N. Y

REPRESENTING

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CUTLERY AND RAZORS,

WASHINGTON WORKS, SHEFFIELD.

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Established 1837.

Manufacturers of **Patent Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Plain and Sewing Machine Locks.**

141 to 145 Railroad Avenue, NEWARK N.J.

Illustrated Catalogues sent on application.

Patented Steam and Hydraulic, April 1, 1868.

EAGLE PACKING,

Of various sizes for **ENGINES and PUMPS,** manufactured by JAMES GLANDING & CO., No. **115** Queen St., Philadelphia. What the proprietors claim for the Eagle Packing: 1. Its general adaptation to all purposes for which packing is used. 2. Its durability. It will outlast any other article in use. 3. Its cheapness. It can be furnished to the consumer at a lower rate than any other packing

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Dec. 7, 1874.

At last, after numerous conferences between the mill owners and boilers of Pittsburgh as to the reduction of wages, the final meeting was held on the afternoon of the 5th instant, and the proposition of the manufacturers of $5 per ton for boiling iron was rejected by the men. This will result in a general suspension of boiling in all the mills to-day, with, it is said, the exception of two, which are running on contracts requiring yet some time to fill. The stock of muck bar and finished iron is said to be considerable, and sufficient to supply the demand for some time, but the lock-out threatens to be a long one, and its consequences are regarded by those competent to judge as likely to be more serious even than those of the famous "long strike" of the boilers some years since. The stoppage of consumption of mill iron in Pittsburgh would seem to be the finishing blow to the blast furnace troubles, and we shall now probably hear of a general blowing out of Western furnaces. The estimated number of men thrown out of employment by this difficulty is 40,000, which must be very liberal, and include all engaged in other mill branches to be correct. That the stoppage will affect pig iron, ore and coal production is undoubtedly true, and for all interests it is an unfortunate occurrence greatly to be regretted.

The most important matter before the public of this city during the week just closed has been the decision of councils providing for the vacation of certain streets along the northern water line of the city to enable the Reading Railroad Company to proceed with the construction of their iron ship yard and dry dock. The city came very near losing this important addition to our industry by refusing this right, and Chester nearly gained a very valuable addition to the numerous industrial branches already centered there. The Reading Company proposes a very extensive construction of shipyards, probably a plate mill, and to which, it is possible in the future, may be added a steel plant, of whatever type of steel production may be most successful at the time, for to steel ships are we surely coming. All this will give employment to thousands of workmen, and it is the avowed intention of the company to proceed at once with the work on a more extensive scale than has yet been attempted. The most important matter, however, to the city is the proposed construction of a very large dry dock capable of accommodating any vessel likely to come here. This is a prime necessity for this city, an accommodation the want of which has been seriously felt, and one which will add greatly to the commerce of our port. So long as large corporations like the Reading Company are willing to spend money in industrial improvements such as this, and especially when, as in this case, it is just so much foreign capital added to our wealth, it is the hight of folly to turn them away from us. In this connection, we note the trial trip of the last of the sixteen colliers built for this company within the year. The Pottsville, like the others, is a 1500 ton ship, and will, doubtless, as all the others have done, show great speed with an economical consumption of coal. The coal reports show that this company transported over their railroad during the year ended December 1st, 1874, 6,348,812 tons of coal, and when the amount of this which is used by New England is considered, it will be seen that a ship yard is as much a necessary adjunct of the company as a car or locomotive repair shop. Iron ship building steadily progresses, and I see it noticed that the Roach works have just closed contracts for five iron steamships, although the lines for which they are intended are not given.

To show the direct benefit of the late Exhibition of the Franklin Institute to that body, it is only necessary to state that the members have determined to widen their field of operations at once. To accomplish this the present building will be altered and improved, doubling the capacity of the lecture room, adding offices for committees, &c. Additional evening classes and lectures are proposed, and the sum of $10,000 is to be spent at once on the library and additional scientific apparatus. A special meeting of great interest to take action on these subjects is to be held to-night, and will doubtless result in immediate action. To show we are not quite dead, in a mechanical or commercial point of view, here, I have to note the clearance of the ship Abner L. Benyon from this port for Peru with a cargo of machinery valued at $300,000. This machinery is designed for sugar refining, and is the most valuable shipment of the kind made from this port for some time. We have been greatly exercised here lately over the miners' outrage in Westmoreland county, where, within twenty miles of Pittsburgh, an armed mob of miners kept up for a whole day a guerilla battle with Italians, non-unionists, who had been employed to work the mines. The affair included more actual fighting than many skirmishes dignified as battles during the war by the press, and the local authorities were absolutely helpless, making, it appears, no effort to stop the outrage. We have been accustomed to hearing of Ku-Klux outrages in the South; it now seems that the miners' union have gone into the Ku-Klux business at wholesale in the North, and need national interference. Thus is the system of trade unionism working out its own destruction, and more rapidly than its worst enemies could have hoped.

While the documental literature of the government departments generally has little to interest the iron trade, there are some exceptions, and one of these is the report of the Chief of the Bureau of Ordnance. This gives some interesting details of the experiments of Mr. Numan Wiard in the conversion of our smooth-bore cannon to rifled guns. The chief of the bureau seems to consider that this cannot be efficiently accomplished, but in England it is thought differently, and considerable success has been attained. The torpedo experiments have developed many interesting facts, among which is that stationary torpedoes cannot be relied on for defence of harbors, from the fact of the radius of destructive effect being so limited as to require great numbers of them, entailing a complication of cables and great risk of accident. In the defence of our large harbors, such as New York, &c., monitors, as a basis for movable torpedoes, and very fast torpedo boats are, therefore, recommended. The movable torpedo is receiving great attention from all the maritime powers, and, it is here stated, that we are as far advanced as any other. Liberal appropriations for further experiments are, however, urgently recommended.

The cheap Transportation Convention in session at Richmond during the week, has brought out an immense deal of valuable information as to both rail and water lines, ship building, the best routes from East to West, and North to South; the new and favored system of canals, and a variety of other matter of interest. The great mistake has been that with all this valuable information the omnipresent "job" is visible in nearly every one. The government is the ground point of attack, and all these new routes lead directly through Congress into the Treasury Department. For instance, the very able and interesting report of Mr. Southall, of Virginia, on the James River and Kanawha Canal, connecting the waters of the Mississippi Valley with those of the Atlantic, shows facts of the very first importance to the country. This line of water transit has distance in its favor over rail by 220 miles from St. Louis or Cincinnati, from Louisville by 500 miles, from Kansas City by 1750 miles, etc. The canal could be kept open eleven months in the year. Its cost is estimated at $60,000,000, which is less than that of any of the existing trunk lines. The annual amount required for repairs is estimated at $1,000,000, and the saving in every bushel of wheat transported from the Mississippi Valley to the seaboard would be 36 out of 49 cents. The report of the Board of Engineers, appointed to investigate this line, strongly supports all these statements, and they may be considered in the main true. The James River and Kanawha Canal is without doubt destined to furnish material for the grandest Credit Mobilier of the century. As a financial operation it would be a magnificently profitable success; as a means of cheap transportation for breadstuffs it is unrivaled, and as a factor in the future development of the iron trade, and furnishing it with the power for export of its product by reducing cost, it is worthy of the closest attention and investigation. But the whole of this magnificent enterprise, perfectly feasible in itself, and easy of accomplishment if undertaken by private enterprise, is killed by the absurd attempt to compel the nation to construct it. The specious plea of improving the times, setting the idle labor at work, and the like, are used as arguments for this end. Government work is never profitable to itself, to the people, or to the enterprise it proposes. Admitting that it will cost $50,000,000 or $60,000,000 to complete this clearly necessary route, is it supposable that with the great requirements of the West a popular interest could not be aroused to furnish a large portion of the capital to start it; or that this done, one or other of the great railways would not, in self-defense, lend its aid to it to control it? And this also done, very little difficulty would remain in the way of obtaining all the other necessary funds abroad. This Convention is doing great service by familiarizing the public mind with the possibility of these enterprises—their necessity is already admitted; but it is preventing the accomplishment of its own ends when it goes to the government to seek aid. No better "operation" is on the cards for the next ten years than the James River and Kanawha Canal, and it will surely be done; but by private capital, without government endorsement.

Scientific and Technical Notes.

According to the convention made with the Swiss government, the railway company building

THE ST. GOTHARD TUNNEL

must lay the estimate for each year's working before the Federal Council. That for the third year, which commenced on the 1st October, has been approved of by the government. It estimates that the progress to be made during this period in the St. Gothard tunnel will be 1922 meters, which, added to the 2453 meters driven during the first two years, will make a total of 4375 meters by the 30th September, 1875. It is also intended to complete the curve at the entrance to the tunnel on the south, or Italian side. This estimate, although somewhat greater than the amount of progress made during the second year, which was only 1660 m., does not appear to be exaggerated, for it must be remembered that considerable difficulties which retarded the advancement of the works had to be overcome during the first half of that period; taking, however, the rate of progress during the months of July, August and September, which was 496 meters, as a fair average, the above estimate would be, if anything, rather below the mark, and it may be safely anticipated, and taking into consideration the improvements which have lately been introduced in the tunneling machinery both at Goeschenen and Airolo, that the advancement to be made during the present year will be considerably above the estimate. At the commencement of October, even in rocks of a most compact nature (a mixture of quartz and felspar), 3 meters a day were driven at the Goeschenen side, and from the 1st to 18th October, an advancement of 70 meters at the north and 40 meters at the south end was made, which would give a daily average of 3·888 meters at the former and 2·222 meters at the latter, or together 6·11 meters per day. The length of tunnel driven from the Goeschenen side last year was 978 meters, or rather more than half that estimated to be done at both ends during the present year. Notwithstanding the comparatively small amount of progress made last year, it must be remembered that it exceeds the greatest amount (1635 meters) ever driven in one year at the Mont Cenis tunnel. It is also estimated that 1200 meters run of tunnel will be completed to full size, so that by the 30th September, 1875, there will be 3300 meters run of tunnel completely finished. The estimated expenditure for the present year (1874–75) for the St. Gothard tunnel is as follows: 3300 meters run, tunnel completed at 3800f. per meter run, 12,540,000f.; heading in advance, 1200 meters at 2500f., 3,000,000f.; total amount for work up to 30th September, 1875, 15,540,000f.; deduct payments made for two first years, 5,190,000f.; leaves for present working year, 10,342,000f.; proportion of government grant due for third year, 3,148,148f.; total amount to be paid, 13,490,148.

A new device for the

MECHANICAL SEPARATION OF IRON FROM OTHER METALS,

such as brass and copper turnings and filings, which may become mixed with it in the work shop, is described by M. Varin, of Paris. Two superposed hollow cylinders turn in the same direction, and upon them the material to be separated is scattered through a hopper. The surface of the cylinders consists in bands of soft iron, which are kept in a magnetic state. The particles of iron are attracted to the cylinders, and at a certain period of revolution are brushed therefrom into a receptacle, while the scraps or other metal fall to the bottom of the apparatus. The machine is said to be capable of separating 1100 pounds of material per hour. It has also recently been employed by M. Mangon for detecting titanic iron in arable earth with remarkable precision—the iron, in such small quantities as fifteen or even seven grains in twenty two pounds of earth, having been readily separated.

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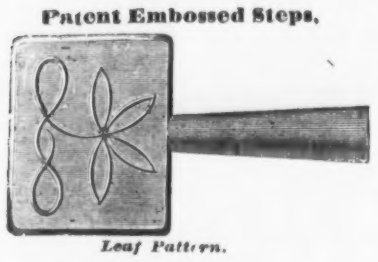
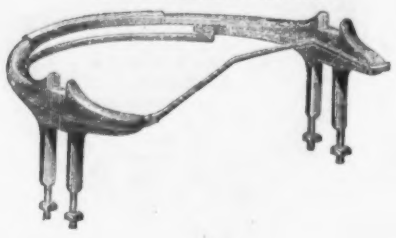
Patent Embossed Steps.



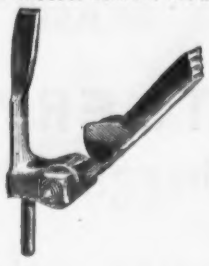
Leaf Pattern.

King Bolt Yokes.

No. 6 Fifth Wheels.



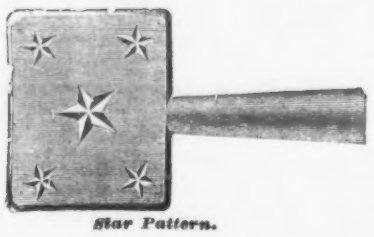
1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

Upper View.

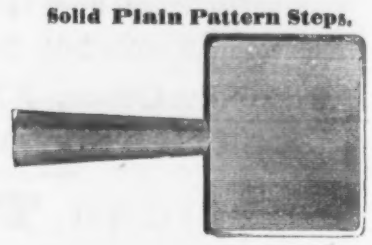
Lower View.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.

Solid Plain Pattern Steps.



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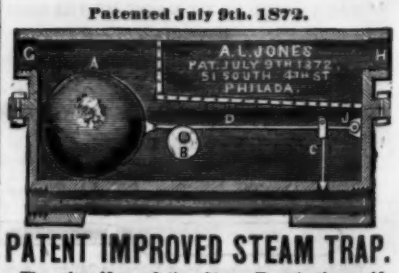

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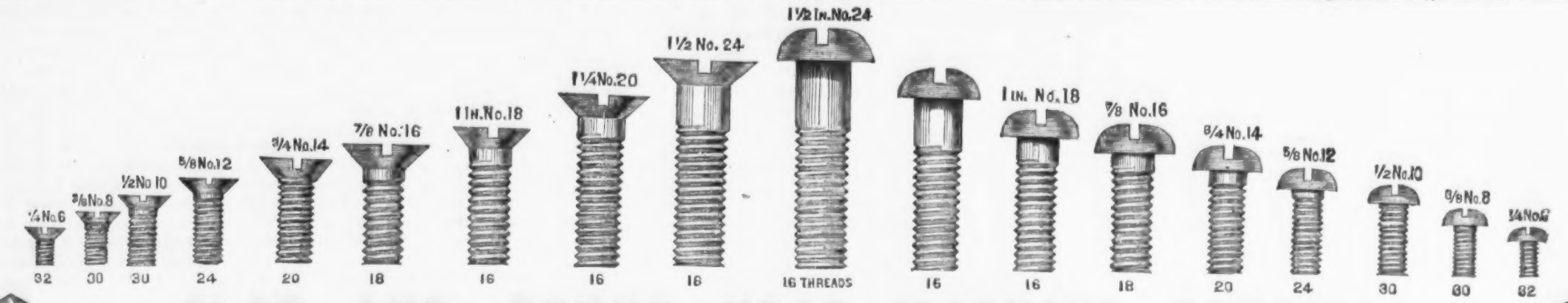

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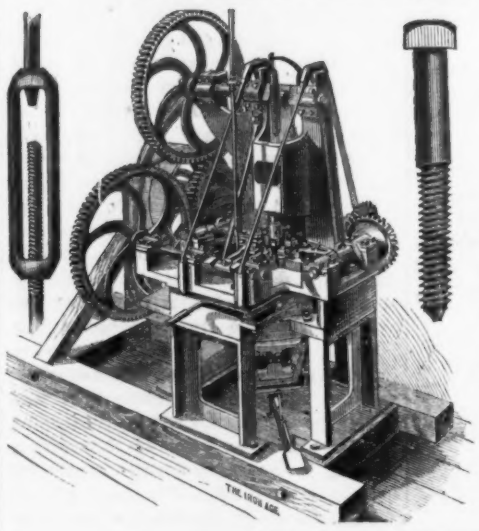

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The Iron Age.

New York, Thursday, December 10, 1874.

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JAMES C. BAYLES . . . . Editor.
JOHN S. KING . . . Business Manager.

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The Trade Union Madness at Pittsburgh.

The strike of the puddlers at Pittsburgh, an account of which is given in another column, is one of the most remarkable instances of trade union madness on record. At the beginning of what promises to be a hard winter, and which will certainly be characterized by an industrial paralysis unlike anything we have known for many years, a large body of men cut themselves off from employment, voluntarily relinquish wages ample for the maintenance of themselves and their dependents in comfort, and bring to a standstill a great industry which, under existing circumstances, cannot be expected to revive and become active again. Its condition was bad—almost hopeless—before, and many manufacturers in the West, with expensive plant and limited capital, were only keeping from bankruptcy by making all the iron they could, selling it for what it would bring, meeting their current liabilities from current receipts, and running in debt to the amount of their current net losses. This foolish strike administers the *coup de grace* to the trade, and it is to be feared that some, at least, of the establishments which are least able to stop production, will be forced to a settlement upon terms disastrous to themselves and disappointing to their creditors. Skilled labor was in oversupply before the strike; now it will be so far in excess of the requirements of employers that wages must inevitably drop to the lowest rates, and thousands who might have supported themselves and their families in comfort during the whole, or greater part, of the winter, will become public paupers, to be supported by charity. How many men, other than puddlers, are thus cut off from all opportunity of earning wages during the coming winter we do not know, but the number is certainly very large, probably 15,000, all told, according to the estimates received by telegraph. Nor will the disaster stop here. The men thus cut off from the earning of wages will have no money to spend, and all branches of retail business must suffer heavily in consequence of the economy of consumption necessary on the part of so large a proportion of the community. There is already a large amount of unemployed labor in and about the city, and with those added who have hitherto found employment in the bar mills, the people of Pittsburgh may look forward to a winter unlike anything they have ever before known. Already we hear threats of labor and bread riots in the city, and it is quite likely that the workingmen of Pittsburgh, like those of Troy, will become both lawless and dangerous. Men who are hungry, whether through their folly or their misfortune, do not usually have a very keen moral sense, and seldom have much regard for the rights of others.

It is suggested by the local papers that possibly the action of the puddlers was only intended to test the temper of they employers, and that when they find them firm and decided to close their works, they will relent. This is not probable. The points of difference between the masters and men may be briefly described as follows: According to the card—a sliding scale based upon three cents as the selling price of bars—the puddler now gets $6 per ton, and makes five heats per day, amounting to one and one-eighth tons. His gross earnings, therefore, are $6·75, out of which he must pay his helper $2·25, leaving him $4·50 per day net. With iron selling at 2·4c. and under, every ton marketed is sold at a loss, and manufacturers must either reduce the cost of iron or stop making it. A meeting of masters and men was called, at which the following proposition was submitted by the former: On a scale of 3c. to 5c. per lb. for iron, a reduction of one dollar per ton for boiling, and to follow the price down to 2·5c. at the same rate of reduction in the scale. This, at 2·5c., would give the puddler $4·50 per ton; when the price should go above 3c.—say, 3·3c.—the scale would become operative, and the price of boiling be $6·10. The proposition was reasonable enough, and the employers temperately argued the question, explaining their position and, in one or two cases, offering to show their books to any disinterested person appointed to examine them. The men knew that the discussion was final, that a refusal on their part of the proposed basis would be followed by a closing of the works; but they deliberately refused the offer and went out. Should they change their minds and conclude to accept, we think they will find it too late. A good part of the mills have muck bar enough on hand to fill current orders, which will not require the working of the rolls more than one day in the week, and now that their fires are out and they are absolved from all obligation to make sacrifices on account of their men, we doubt if many of them will care to resume again until there is a better chance of making expenses than is now offered. A few establishments which cannot afford either to run or stop, may choose the former as the only way of tiding over the winter and in the hope of picking up odd orders for special shapes and sizes upon which a little profit can be made: but it does not seem probable that there will be any general resumption until there is a decided improvement in trade to warrant it. By that time labor may be had on employers' terms, and if those terms do not include independence of trade union control and dictation, a golden opportunity to emancipate both capital and labor from trade union tyranny will be lost. We believe as fully as any one can in the "dignity of labor," although the crimes and mistakes committed in that name have been as many, and as serious in their evil consequences, as those committed in the name of liberty. We believe that labor is entitled to a fair and equitable share of the profits of production: what that share is can only be determined by a free competition between capital seeking labor to make its investments productive, and labor seeking employment in useful production. But capital has some rights which even labor is bound to respect, and when labor, through the agency of a trade union, takes capital by the throat and says to it: "Obey my mandates or I will strangle you," we think the time has come when manufacturers should organize for their own protection, and employ no man whose connection with a trade union imposes upon him the conflicting obligation of a divided duty. It may seem a harsh expedient, but it would confer a lasting benefit upon labor and settle forever a struggle which, under any other conditions, must be prolonged indefinitely.

The Requirements of the Pig Iron Trade.

The condition of the pig iron trade in the United States is such as to excite the gravest apprehensions in the minds of those who have capital invested in furnaces, and are dependent upon the sale of their current product. Briefly to review this condition is to say that the price of pig iron has been reduced since 1872 full 50 per cent., the same grades of iron now selling at $25 which sold for $50 at that date. Labor has been reduced from 25 to 33 per cent., ores have declined on an average fully 30 per cent., while coal alone remains at the former rates, without reduction. Estimating all the benefits from these reductions, the cost of manufacture still remains so very near the selling price as to leave but slight margin of profit, if any, while the uncertainty of sales and delay in their accomplishment swallows up what little possibility of gain there may be in the business. The efforts of the trade to relieve themselves from the dilemma in which they are placed by agreeing to reduce production, have been noticed in these columns, and are still progressing, but the conditions in different sections, and at different furnaces in the same section, are so varied as to prevent the possibility of unanimous action in this respect. There remains for this branch of the trade, therefore, but two avenues of escape from the present unpleasant condition. The first is to be found in the general improvement of trade, and the consequently increased demand for pig metal. As this is a measure of relief beyond the control of the furnace owners, it cannot be further considered than as a possibility. The second, however, lies in the practicability of so cheapening the cost of production as to meet not only present low prices without loss, but to meet, also, still lower prices, and maintain the integrity of the industry under all circumstances likely to affect its prosperity in future. Whether this can be done or not is the problem before the trade to-day. To accept this as a measure of relief, however, it must be conceded that consumers of pig metal will purchase the product at what they consider fair prices to themselves, and this from the current of the market is pretty clearly evident. The next question for consideration is in what element of cost can the reduction be made, and made easiest. In coal, it is quite evident that the anthracite furnaces cannot look for any immediate reduction. Combinations of producers, mine owners and transporters have, for the present at least, so arranged matters as to prevent the possibility of cheaper coal to furnaces east of the Alleghenies. Labor has been reduced as to wages as low as is probably either possible or desirable, and it is not to be expected that any relief to the producer is to be looked for in this quarter. In the price of the ore, therefore, alone is to be sought the grand measure of relief which shall enable the cost of producing pig metal to be so fixed as to admit of a living profit to the industry, by enabling sales at prices to meet views of consumers. The cost of ore to the ton of pig iron, as furnished by Mr. Baker's table of cost of pig iron from 1850 to 1874, published in *The Iron Age* of March 26, 1874, has advanced from $5·75 in 1850 to $14·75 in March, 1874, being nearly 300 per cent. We find the cost of ore to the ton of pig iron by the same tables to have been $13·64 in 1872, and $14·75 in 1874. The average selling price for pig iron in 1872 was probably $40; in 1874, for the same grade, produced at a total cost of $31·47, or only 94 cents per ton less than in 1874, it has certainly not exceeded the cost of production. It is to be noted, however, that various elements of cost, excepting that of fuel, have materially declined since the date at which this tabulation was made, viz., March last. Taking this fact into consideration, it is probably a fair estimate to place the cost of ore to the ton of iron at furnaces east of the Alleghenies at an average of $12 per ton. Looking to the reduction of this cost as the prime factor in the success of future production of pig iron in the localities named, there are several obstacles presented for consideration. Prominent among these is the fact that a large proportion of Eastern furnaces, especially those of Eastern Pennsylvania, have continued to use expensive material in ore, from the fact of owning by purchase, or lease on royalty, ore mines which, from either original inferiority or impurity and subsequent exploitation to a considerable depth, or both, have very materially increased the cost of the ore to the ton of iron. That this is the case where the New Jersey magnetites are used in admixture with the native hematites of Eastern Pennsylvania is undeniably true. In future we may recur to the indisposition on the part of furnace managers and owners to seek, or try when presented, new and better ores. Doubtless this indisposition is in great measure attributable, since the panic, to impecuniosity rather than prejudice, and previous to the panic the condition of the market accepted any product offered. The complaint is made, however, and with reason, by owners of the later discovered and purer ore beds and deposits, that the furnace men will do nothing to help themselves in this matter. Another obstacle to the introduction of cheap ores lies with a class of furnaces, especially in Pennsylvania, which purchase, and have for years purchased, rich northern magnetites, always at high cost, and smelted them in admixture with low grade, and generally impure, native hematites. These two obstacles are, therefore, prominent in the way of reducing cost of material for iron production, but not insurmountable. The panic and its effects have taught one lesson, namely, that ordinary foundry and mill irons must be reduced in price to find a market. The great increase in the demand for Bessemer pig has taught another and very forcible lesson, in that the quality of American iron must be so improved that this demand can be supplied wholly from American ores, and at prices for the pig iron which will enable the production of steel rails to admit of their sale at the prices which ruled for iron rails a year since. A glance at the statistics of Bessemer production will show this very clearly. By the estimates furnished to the agent of the British government, published lately in *The Iron Age*, and presumably correct, the output of Bessemer steel for 1874 will not fall short of 220,000 tons. Allowing for loss in melting and converting, this product would probably represent a consumption of at least 260,000 tons of pig metal, and this consumption will be next year increased, by the addition of three new Bessemer plants, to probably one-half more. Hitherto the product of Bessemer steel in the United States has been almost entirely consumed in rails, and the demand for that purpose is even now rapidly increasing under the very pertinent aphorism that "bad iron rails have made "the steel rail trade." But in the very near future a large demand will be made on the Bessemer works for ship plates and beams, for machinery steel and Bessemer steel castings to pattern for machine purposes, all of which, although not now made in the United States, are within the possibilities and will be called for from this process, because it is the only existing process which can deal with large masses of iron and turn out a heavy product in a brief period and at an economical rate. Bessemer ores are now costing probably fully $9 to $12 per ton at furnace, and quite $20 to the ton of iron, if not more, while Bessemer rails are sold at $85 per ton, and even lower, as we write. Can any intelligent iron master doubt that this cost must decrease as to the Bessemer pig when the tendency to lower prices for the finished product is so clearly evident? Steel rails must sell within two years at $60 per ton, at works, to supply our existing railways even, and it is in the cost of the pig that this must be done. We have shown at various times of late in these columns that ores exist in accessible localities which offer to the furnaces of the Atlantic slope the material for lower cost iron. Against the expensive magnetites of Lake Champlain we have noted the titaniferous ores of the same district. The objections current against the working of titanic ores are, in view of present metallurgical progress, puerile and unworthy of the American iron master. It suffices to say that these ores are successfully used alone in England with a great commercial profit, and in admixture in Sweden; and wherever intelligently worked in the United States, have produced excellent iron. Not to utilize them now, when they may be had at half the cost of less pure magnetites, is simply to refuse an opportunity to cheapen the cost of product. To say that the metallurgical skill to indicate the proper flux and admixture for such ores is not in the United States, is simply to stultify the management of the industry and to ignore our progress in the science of iron making. To accept and utilize these ores is at once to reduce the cost of production and improve the quality of the product. In addition to this, we have of late, in another article, announced the existence of immense deposits of spathic iron ore contiguous to the Hudson, but 120 miles from New York, of easy access for mining and of low cost. These ores, from their purity, are true Bessemer ores, and, from their price, admit of use, also, in place of hematites, while their constitution makes them far more valuable in admixture with magnetites than hematites can be. Further, these ores, by the addition of a slightly more manganiferous ore, are precisely the material for the production of low cost spiegel—another adjunct in reducing the cost of Bessemer steel. Since writing the articles referring to these ores, they have been used in admixture with ordinarily pure magnetites for Bessemer pig, the product being pronounced the purest Bessemer pig yet made in the United States. We are also informed by the best metallurgical authority that they furnish the proper admixture for the reduction of the titaniferous ores of Lake Champlain, Virginia and North Carolina; that there is no mystery or secret about the successful working of ores containing even a larger proportion of titanium than those mentioned show, and that the ordinary intelligence which is possessed by every furnace manager will, with this admixture, produce not only a superior Bessemer pig, but a mill iron far better than our best average. Nor are these the only supplies of ore which are within the reach of the furnacemen of the Atlantic slope at a cost far below those now in use. Throughout Southwestern Pennsylvania there are, on a line from Cumberland, Md., to Bedford, Pa., and further east, some fifty miles or more of fossil ores of the greatest purity and value, making iron equaling the celebrated Juniata iron in quality, and mixed with hematites of lesser purity, but equal richness, which, while perhaps unsuitable for Bessemer ores, are highly desirable for the production of foundry and mill irons. These ores can be delivered to the furnaces of the Susquehanna and Schuylkill valleys for less than those they are now using by 50 per cent., we are credibly informed, and they have been offered at a royalty of ten cents per ton, without enterprise being found to develop them. Such are a few of the opportunities before the furnaces of the Eastern slope.

To the Western furnaces the cheap bituminous coals for coke, and the fine natural iron making fuel found in block coal have, in a measure, balanced the absurdly high cost of Lake Superior and Iron Mountain ores, which, while from their purity they have invited to the production of excellent iron, from their high cost have prompted to the use in admixture with them of inferior native hematites, until the resulting iron has too generally been far below even mediocrity. But the hard times and low prices have even outborne the benefits of cheap coal, and we hear on all sides at the West an outcry for cheaper ores. For the benefit of our Western readers we lately noted the possibilities of putting the fossil ores of Northern Alabama, and the magnificent hematites of Russell's Valley, at points in the Mississippi Valley, and in Pittsburgh, at about half the present cost of Lake Superior or Iron Mountain ores. We will add to our former statements of ore, one of Western Tennessee, on line of water communication, with constant navigation, and which can be put in Pittsburgh at $6 per ton, giving present owners all the profit asked. These ores are from Stewart county, Tennessee. Their reputation has been made since 1829. The iron made from them, with charcoal, not only rivaled Swedish in purity, but commercially kept Swedish bar out of the New Orleans and Southern markets previous to the war. The boiler plate rolled from this pig commanded the St. Louis and Cincinnati markets for years, and in those days of extreme high pressure and racing speed on steamboats, it is of record that no boiler made from this iron ever exploded. These statements may be accepted as true after a glance at the following analysis:

No. 1.	
Protoxide of iron	70·00
Water	12·00
Manganese	2·5
Silica	4·5
Alumina	1·00
	100·00

Metallic iron, 61·75 per cent.

No. 2.	
Protoxide of iron	80·00
Water	15·00
Manganese	1·00
Silica	4·00
	100·00

Metallic Iron, 62 per cent.

These ores are brown hematites, overlying the carboniferous limestone. As will be seen, they are of extraordinary purity, and are found in vast quantity. They are only 100 miles by water from the Ohio River, 500 from Cincinnati, and 1000 from Pittsburgh, and but 300 miles from Cincinnati by rail, and with equal value to either of the standard ores of the West they are attainable at half of the cost. But we have shown enough here to prove our assertions that the cost of

ore to the ton of iron may be materially reduced both east and west of the Alleghenies without detriment to the quality of product. In this we have simply done our duty as journalists; to the producing interest it remains to utilize this information for its own benefit. Any movement looking to an escape from the present difficulty, by combination to stop production, can, even if successful, but prove of temporary benefit. Everything before the industries of the United States indicates that we are returning to the prices current before the war. To meet these, the cost of production is being reduced on all sides. The pig iron trade can be no exception to the general rule, and if the distance of the favorite ores from points of consumption, and their increased cost of mining, preclude a similar reduction in their price, the only alternative for that industry is to seek new sources of supply where price and quality are alike combined to suit the exigencies of the occasion. We are not among those who believe that the days of iron making in the Lehigh are numbered, or that Pittsburgh's prosperity is to give way to a new iron city in the Gulf States. The history of the industry throughout the world proves that where capital has once invested largely in working plant, there the industry will continue to thrive.

The International Character of the Centennial Exhibition.

The allotment of space in the Centennial Exhibition shows that it is intended to be decidedly international in character. Of a total of 486,090 square feet, available for purposes of exhibition, only 123,160 feet will be reserved for the United States. The rest, according to the official allotment, is divided as follows: Great Britain, India, Canada and Colonies, 46,748 square feet; German Empire, 27,264; France, Algeria and other colonies, 27,264; Austria, 23,328; Brazil, 17,520; Argentine Republic, 15,552: Spain and Colonies, 15,552; Peru, 11,664; Mexico, 11,664; Italy, 11,664; Russia, 10,044; Sweden and Norway, 10,044; Chili, 9744; Persia, 7776; Turkey, 7776; Netherlands and Denmark, 7776; United States of Columbia, 7776; Japan, 7290; China, 7290; Switzerland, 6156; Venezuela, 5503; Guatemala, 5508; San Salvador, 4536; Nicaraugua, 4536; Equador, 3888; Hayti, 3883; Sandwich Islands, 3888; Honduras, 3888; Siam, 3451; Liberia, 2268; reserved space, 21,408. If all this space is filled we shall have a representation of foreign products and manufactures which will afford us plenty of chance for comparing our best work with that of foreign countries. Its international features will give the exhibition vastly more interest for foreign visitors than it would have if strictly national in character, and will far more worthily commemorate the centennary of American independence: while exhibits from other countries, embracing things new and curious and strange, will certainly detract nothing from its interest for our own people. The opposition in Congress to an international exhibition seems to have been based upon nothing more substantial than "buncomb."

In rolling mills and in works where cast steel is made, upright cylindrical boilers are sometimes used, which are heated by the waste gases from the furnaces. These are often set into the side of the chimney or immediately connected with it. In such cases if an explosion occurs the chimney is also destroyed, increasing the danger to life and property. For this reason the Prussian government has prohibited the setting of boilers in this manner. Even by ordinary work the uneven expansion of the masonry endangers the stability of the chimney, unless special precautions are taken in building it.

We learn from *Annal des Mines* for 1874, p. 559, that the total number of boiler explosions in France for the year 1872 was 21, whereby 13 persons were killed or fatally wounded, and 32 not fatally wounded. The following is a list of the boilers that exploded:

Horizontal, cylindrical without flues	2
" " with "	8
" tubular boilers (locomotive)	6
" cylindrical, heated within	1
" with return flame, peculiar construction	1
Copper finishing cylinder	1
Long cylinder in paper factory	1
	21

In six cases the construction was at fault; in ten cases it was carelessness of the man in charge.

A statement of the steam companies engaged in the trade of the Pacific coast gives the following results: Pacific Steam Navigation Company, 56 steamers; South American Steamship Company (native line) 10 do.; German "Kosmos," 6 do.; Belgian, 4 do.; White Star Line, 4 do.; Compagnie Generale Transatlantique, 3 do.; total, 83 steamers. The steamships of the first named company made 45 voyages from Liverpool and back, the gross receipts being stated at $3,000,000 for cargo, nearly $2,000,000 for passengers and $120,000 for postal service. Altogether 524 voyages on the coast and 124 to Europe were made by the various steamers enumerated. This year the depression in financial centers has led to some of the lines being withdrawn from the trade on this coast, and the Pacific Steam Navigation Company have largely reduced the number of steamers employed on their line *via* the Straits of Magellan, the sailings now being fortnightly, in lieu of the weekly service carried on last year.

Hon. Daniel J. Morrell on the Outlook for the Iron Trade.

We have received the following letter from Hon. Daniel J. Morrell, of the Cambria Iron Company, in reply to one addressed him by the editor of this journal:

JOHNSTOWN, PA., December 5, 1874.

To the Editor of The Iron Age: DEAR SIR—Yours of the 24th ult. would have been answered sooner if I had not been away from home. The business future depends upon so many contingencies that no one can predict with certainty what it will be like, and one man's opinion about it is as good as another's.

The movement to reduce the production of iron is compulsory, as prices are now below cost, and while stocks on hand may be closed out at a sacrifice, there will be no disposition to continue operations at a loss. Whether there is an agreement to that effect or not, I look for a marked curtailment of production, which will tend to exhaust stocks on hand and bring about a more active demand. In some localities iron can still be made without losing money, but in the common grades which enter into the production of iron rails, prices are still below cost, even with the present low rates of wages.

There are new conditions of the iron business, resulting from various causes, which may have a permanent effect upon the trade. The mania for railroad extension made an extraordinary market for iron rails, and brought into existence a number of rail mills, many of which have no special facilities for production—some, indeed, being badly located, and they have been the principal consumers of low grade pig metal. The financial panic which stopped railroad building closed up these mills, and it is not unlikely that this will be permanent.

Steel rails are now sold below the price obtained for iron rails at the time of the failure of Jay Cooke, and the market for low grade iron rails must be hereafter exceedingly limited, a condition which will affect the production of inferior pig metal. The longer life of steel rails makes them more economical in the end than iron rails, and companies able to pay the difference in first cost, will give steel the preference. Iron rails of poor quality will find no market, the better grade will be employed by roads having light traffic, first class roads will be compelled to use steel, and will find it to be to their advantage. There will be a demand for superior grades of metal suited to the manufacture of steel, and better grades are now being produced. There is great activity in the way of improving furnaces, in the selection of pure ores, the washing of ores and coal, and other matters which will have a tendency to raise the quality of the product. Some of the new furnaces, lately completed, are of extraordinary size and capacity, and their immense production confuses the statistics of the trade, and makes general estimates unreliable. One of these, now running, will make more iron than five or six of the old style, reputed out of blast.

I look upon all combinations of producers of ore or metals, to hold up prices, as futile. They may have been effective in the past, but the condition is now such that prices must be regulated by the law of supply and demand, and in all probability will rule low for some time to come.

The troubles in the iron trade have affected labor and wages, not only in that, but also in all other industries. During the years of prosperity, while iron works were being constantly extended, many men were drawn into the business. The productive capacity of the blast furnaces of the country has grown from 750,000 tons before the war, to three and a half millions now, and would seem to be in excess of present demands and all the needs disclosed by the near future. Should this be the case, many iron makers must seek employment in other industries. The wages of iron workers have also been higher than those of mechanics, and, in some cases, larger than was justified by the amount of skill required in their employments. As this had a tendency to raise wages in other trades, so the change now going on may not only equalize the rewards of labor, but may also have the effect to generally depress wages. The labor market is, and will be, unsettled for some time, and in the end there may be a considerable migration of skilled workmen Westward to the public lands, and they will become producers of food, instead of being the farmers' best customers.

Lock-outs and strikes are often blind and apparently useless; but generally through their want of success they bring about a proper correspondence between wages and the value of labor. The Cambria Iron Company has had its experience in this matter, and the result is the general acceptance of a basis and sliding scale, which regulate wages by the price of rails, to the satisfaction alike of employers and workmen, though both suffer by the hard times, and would be glad to see an improvement in the market.

It must be remembered that even our present low prices and wages could not be obtained without the protection of existing tariff duties. Reduction of duties would have a most damaging effect upon the iron trade, and would prevent or postpone the general revival of business most anxiously looked for by the whole country. The threat of free trade legislation makes the future uncertain, and is, for that reason, injurious, and Congress, in its coming session, should do what is possible to assure our manufacturers that their situation shall not be made worse through any concessions to the foreign influences which are always seeking modifications of our revenue laws. It is within the power of Congress to at once remove the incubus which rests upon the industries of the country, and effect the immediate revival of business by such legislation as will carry to completion the trans-continental lines of railway in which the government is already interested, and by the repeal of the ill-advised reduction of duties made in 1872. These two measures would restore confidence, set idle laborers to work, and result in great benefits to the people and the public revenues.

Yours, truly, D. J. MORRELL.

The Great Strike at Pittsburgh.

Work at the Rolling Mills Stopped for the Winter.

One of the most important and, we may add, most disastrous strikes recorded in the industrial history of the United States began at Pittsburgh on Monday of this week. At least 15,000 men are out of employment by the strike, and 800 puddling furnaces are standing idle. The history of the dispute which has culminated in this madness on the part of the puddlers is easily told. When the reaction arising from the sudden prosperity felt during the war commenced to be felt, an agreement was entered into between the manufacturers and puddlers by which the price to be paid for work should depend upon the card prices of iron. This has been adhered to up to the present time, with but a slight variation, and in consequence of its terms the puddlers were paid $6 per ton on the card rate. Owing to the panic and the great depression that followed, the manufacturers say that these figures for puddling render it impossible to continue running. Under the sliding scale, the lowest point at which a reduction of wages follows a reduction of price in iron is when the price reaches three cents. At the present time iron can be bought at two and a half cents, while the price of puddling still remains at $6. The manufacturers claim, therefore, that the sliding scale is unfair, in view of its not reaching below three cents; but even did it operate when such low prices are reached, the proportion of deduction in price to that of wages is not equal. For under it, with iron at a selling price of $3 per ton, the price of boiling would still be $3·10 thereupon.

ULTIMATUM OF THE MANUFACTURERS.

The manufacturers proposed to the puddlers their ultimatum as follows, giving them thirty days wherein to accept the proposition, and in the event of their failure to do so they were to shut down the mills:

On a scale of three to five cents per pound for iron a reduction of $1 per ton, and to follow the price down to two and a half cents, card rates, at the same rate of reduction as in the scale. This, at two and a half cents, would make boiling $4·50 per ton, agreeing that when prices of iron advances to over three cents—say, three and three-tenths per pound for iron—the scale to be operative, and the price of boiling shall be $6·10 per ton.

The manufacturers made no demand that the arrangement should be permanent, but asked only that it be kept in force until the present stringency of the market and times has relaxed, which would probably be no longer than the 1st of March, after which, if the price of iron should go above three cents, the old card rates would be resumed.

MANUFACTURERS AND PUDDLERS IN COUNCIL.

On Saturday last, with the hope of avoiding a strike, the following manufacturers met a delegation of puddlers: F. D. Wood & Co.; Rogers & Burchfield; Graff, Bennett & Co.; Jones & Laughlin; Spang, Chalfant & Co.; Lewis, Bailey, Dalzell & Co.; J. Painter & Son; Phillips, Nimick & Co.; Byers, McCullough & Co.; Lewis, Oliver & Phillips; Glass, Neely & Co.; Zug & Co.; Reese, Graff & Woods; Shoenberger & Co.; Carnegie, Kloman & Co.; Lindsay & McCutcheon; Everson, Macrum & Co.; Chess, Smythe & Co.; Pittsburgh Forge and Iron Company, and the Pittsburgh Bolt Company. The puddlers then and there rejected the manufacturers' proposition and submitted one of their own, which was to the effect that they were willing to drop fifty cents instead of one dollar. This was to be done by continuing the card on down to two and a half cents. The manufacturers refused, claiming that it was the understanding when the card was established, that when iron went below three cents it (the card) was to be readjusted, and the same if it went above five cents. Then it was seen that a lock-out was inevitable. During Sunday on all the street corners of South Pittsburgh could be seen knots of laborers discussing the situation.

THE LOCK-OUT WORKS CLOSED.

This morning broke gloomily, with a drizzling rain falling on the thousands of laborers wending their way as usual to the mills. On reaching their accustomed places of employment all seemed deserted—the fires were out of the puddling furnaces and an air of chilliness and desertion generally pervaded the premises. At the American Iron Works, the second largest in the United States, seventy-two furnaces were blown out, throwing out of employ over 400 men. As each furnace uses on an average 1000 bushels of coal per day the consumption of this article in this mill alone amounted to 72,000 bushels daily. Taking into consideration the families of these men and others dependent upon them, there are more than 1500 persons without means of support.

The puddling department of J. Painter & Sons, containing some fifty-two furnaces, also closed to-day, throwing out of employment 208 puddlers and helpers. Some sixty miners, employed to mine the coal for the mill, will also lose employment. The firm have enough muck iron in stock to run for some time yet.

Twenty-five furnaces of Reese, Graff & Woods are idle, with over 200 men out of work, and with nothing laid by to help them through the winter.

The puddling department of the Clinton and Millvale Mills were closed, and some 350 or 400 men will be discharged in each mill. Both mills used some ninety furnaces, from which the fires were put out.

Twenty-three furnaces of Lewis Bailey & Dalzell stopped operations, throwing some ninety-two men out of employment. This firm refused this morning an Eastern order for 7000 tons. It could not be filled, except at a loss of $7 per ton at present prices.

Byers & McCullough employ 50 puddlers and 400 other hands. This firm are members of the Association, and will abide by its action. They will most likely shut down on Saturday night.

Twenty furnaces of Chess, Smythe & Co. also suspended this morning.

Shoenberger & Co.'s 450 employes were discharged from their works, leaving all their furnaces, twenty-nine in number, closed.

The mills enumerated here comprise but a small portion of those which suspended operations, and the number of men out of work may be safely set down at 15,000. The mill owners say it now rests with the puddlers to say whether the lock-out shall continue or not. They are satisfied that they have done all that was in their power to avert the lock-out, but they will keep the furnaces closed till the strikers accept a reduction.

A statement by a puddler of the earnings of this class of labor, is that for eleven days' work he had puddled 11 tons 11 cwt. of iron, for which his gross receipts were $66 30. Out of this he paid his helper $2 40 per ton, $26 40, leaving him $39 90 for the two weeks' work. This does not, they say, represent an average of a year's work, as there are unavoidable losses of time for breakages, furnace days, &c., which reduces them to 240 or 260 working days per year. Their annual earnings they place at from $700 to $900.

The Bridgewater Iron Company.

We lately had the pleasure of visiting the works of the Bridgewater Iron Company, one of the oldest iron works in the United States, and one of the most interesting. Bridgewater, Massachusetts, is a pretty little town on the Old Colony and Fall River Railroad, and the iron works, which are, we believe, the largest in New England, have an interesting history. The iron business was established in this place, on or near the site of the present works, as early as 1722, by James and Abiel Packard, Daniel and David Haward and Constant Southworth—at least these gentlemen certified to the General Court that they owned these works in 1750. In 1738, Hugh Orr, a Scotchman, added to the manufacturing industries of Bridgewater a forge with a trip hammer—the first ever set up in that part of the country. He made scythes, axes, edge tools, fire arms, brass and iron cannon, which he cast solid and then bored out, and solid round shot. In 1786, Ezekiel Reed invented the nail cutting machine at this place and then established the industry. This machine was subsequently improved by a man named Odin, and the cutting and heading were done at one operation. In 1875, two slitting mills were built in Bridgewater, one of which was the origin of the present great establishment of the Bridgewater Iron Company. Here was forged the first locomotive crank ever made in America. From 1810 to 1816 these works were owned by Lazell, Carey & Co. From 1816 to 1826 they were owned by a company under the name of Lazell, Perkins & Co. In 1825 the company reorganized under the name of the Bridgewater Iron Manufacturing Company, and quite recently a reorganization was effected by a special act of the legislature, under the name of the Bridgewater Iron Company: G. B. Stetson, president; Nahum Stetson, secretary and treasurer; and James Ferguson, general superintendent. On the 28th of November last, Mr. Nahum Stetson had been in the company 49 years, and Mr. G. B. Stetson 28 years. Mr. Ferguson has been in the company's service about 18 years, and has witnessed its growth from small beginnings to its present great size and financial success. He is a gentleman of large intelligence, a thorough mechanic and an energetic manager.

The works of the Bridgewater Iron Company now cover between 10 and 11 acres, and are divided as follows: Two pattern shops, 150 ft. by 60 ft. and 75 ft. by 25 ft. respectively; two machine shops, 175 ft. by 185 ft. and 125 ft. by 75 ft.; a forge, 300 ft. by 70 ft.; two tack plate mills, 300 ft. by 100 ft., and 100 ft. by 85 ft., containing five trains of rolls; a bar iron and copper sheathing mill, 225 ft. by 100 ft., with a wing 100 ft. by 65 ft., containing 3 trains of rolls; a brass foundry, 75 ft. by 50 ft., containing 9 furnaces; a tube works, 200 ft. by 60 ft., with wing 100 ft. by 45 ft., containing 10 sets of drawing machinery; a charcoal forge, for making scrap iron into blooms, 75 ft. by 50 ft., containing 6 furnaces; and a foundry for miscellaneous castings, 150 ft. by 85 ft.

Among the remarkable pieces of machinery in the various departments of the works we noticed the following which deserve mention: A boring mill, 20 ft. in diameter, weighing 130 tons; a slotting machine, 3 ft. 6 in. stroke, weighing 85 tons; a double lathe for turning steamer shafts and other large forgings, 85 ft. between ends, and weighing 130 tons; a double planer, 30 ft. square, weighing 35 tons; three steam hammers, as follows: 1 ton, 3 ft. stroke; 7 tons, 8 ft. stroke, and 11 tons, 10 ft. stroke; six helve hammers, and a trip hammer which is very interesting on account of its primitive construction and great age. It is run by a water wheel, and has done service beyond the recollection of any one now employed in the works.

The two cupolas and one air furnace in the foundry will melt 60 tons of iron, and all the requisite facilities are at hand for producing the largest and heaviest castings. During the war some castings for sloops of war were made here, of which the cylinders weighed 15,000 lbs. each, the condensers 28,000 lbs. and the channel plates 34,000 lbs. The heaviest brass casting we know to have been made in the brass foundry of this establishment weighed six tons.

The distinguishing feature of the Bridgewater Iron Works, however, is the forge department. Until very recently no shop in the United States had facilities for producing such large work.

The steam hammers, of the Nasmyth pattern, are already mentioned. In this forge some notable work has been done. Here were forged the anchors of the old Constitution; the shafts and wrought iron work of the New Constitution; amounting in all to some 250,000 lbs; the heaviest forgings for the Iroquois, Narragansett, Pawnee, Kearsarge, Ossipee, Sacramento, Juniata, Adirondac, Canandaigua, Sagamore, Cayuga, Kanawha, Unadilla, Ottawa, Seneca, Pembina, Kennebec, Owasgo, Aroostook, Tahoma, Pinola, Sebago, Lenora, Conewaugh, Maratanza, Tioga, Octorora, Port Royal, Paul Jones, Mississippi and Merrimac; the wrought iron work for the Golden City, Colorado, Arizona, Henry Chancey, Montana, Great Republic, China, Japan, Alaska, and America; and many other great forgings, among which we remember the great cranks for the pumping engines of the Pittsburgh water works.

During our visit we had the pleasure of witnessing a part of the work of forging a new shaft for the steamer Bristol, of the old Colony line, to replace the one lately broken. It was a very interesting operation, and was conducted under the supervision of Mr. Charles Hall, the foreman of the forge. Every operation was performed with promptness and precision, which accounts for the uniform excellence of the work turned out by this establishment. At 10·45 a. m., the bricks which closed the mouth of the furnace around the shaft were pulled down, and the immense, glowing mass of iron was withdrawn and swung round under the hammer. In about twelve minutes the hammering is completed, and the end of the shaft flattened to receive the pile of slabs which is laid upon it, about 2760 pounds. In 18 minutes from the time it came out it was returned to the furnace, the brick wall was again built up, and the shaft left to heat again to the welding point, which required some hours. The work turned out of this forge averages nearly 3000 tons per annum.

Our space does not permit us to enter upon a detailed description of the works, although every department possesses some feature of especial interest which we hope to speak of when we shall have an opportunity of again visiting the works. One of the most curious and interesting of the operations is the manufacture of seamless brass and copper tubes for engine boilers and plumbers' use. These tubes are first cast of the required weight, and, after annealing, are drawn through dies upon mandrills. After each drawing they have to be annealed. The tubes made in this mill range from three-sixteenths of an inch to 6 inches, inside diameter, and are of any length under 24 feet. There is also a roll train for rolling tubes. The tubes are cast, annealed, rolled flat, opened and finished on a mandrel. This is a simpler and cheaper operation than drawing, and a mill is to be built for the manufacture of rolled tubing on a larger scale. After finishing, every tube is tested under a pressure of 400 lbs. of water and 90 lbs. steam, and if they pass this test without fracture they are ready for use. When required, these tubes are tinned inside and out, or inside only, by a process invented and patented by Mr. James Ferguson. They are united at the ends, like iron gas pipes, with screw joints. We are informed that these tubes are coming into use for plumbing work, and that in a large number of the finest houses in Boston they have superseded lead pipe. In this city the water is conducted through the Windsor Hotel and the Stevens House in brass piping. We hope to note more fully in a future issue some of the minor operations conducted at these works, of which we have only found space in this article for passing notice.

Like a great many other great things, the invention of the hot blast is now claimed for an American. It is claimed that as far back as 1833, one year before Neilson filed his patent papers, Dr. Frederick W. Geisenhainer, of Schuylkill county, Pennsylvania, was experimenting with ovens for heating air before its introduction into the blast furnace; and the result of his experiments on a small scale was so satisfactory that his caveat for the patent was prepared. His experiments continued through 1837, '38 and '39, in connection with Mr. William Lyman, who was then running the furnace at Pottsville with charcoal. These gentlemen were encouraged by Mr. Nicholas Biddle (of United States Bank fame), of Philadelphia, and Col. Joseph Paxton, of Catawissa, Pennsylvania; the former offering a premium of $1000 for the first ton of anthracite pig iron made in this country.

Theories of Steam Boiler Explosions.

BY DR. FERDINAND FISHER.*

Apart from the use of bad materials, from bad construction, and from bad workmanship, the alleged causes of steam boiler explosions may be included under the following heads:

1. Excessive pressure of steam.
2. Electrical action.
3. Explosive gases.
4. Spheroidal state.
5. Superheated water.
6. Sudden relief of pressure.
7. Shocks to the boiler.
8. Over heated plates.

1. *Excessive pressure of steam* is, only in the rarest cases, the direct cause of an explosion; that is to say, of so sudden a destruction of the boiler that it is torn into fragments, and these are projected to a distance. Such a violent result as this can have its immediate cause, according to Grashof, only in the sudden conversion of a large amount of heat into work.

That boilers may, under certain conditions, sustain a very high steam pressure notwithstanding the fact that they are so far damaged that upon inspection they may be perforated in various places by the blows of a small hammer, is well known. The experiments of Andraud, on the other hand, have shown that an iron boiler of 100 liters capacity, whose walls were two millimeters thick, could be burst by condensing air into it to a pressure of seventy-five atmospheres, but could not be exploded.

Moreover, the experiments of Stevens and of the Commission appointed by the United States Government, have proved that an excessive pressure of steam in a boiler in which there is a weak spot, causes simply a rent (or where the plates are brittle a piece may be blown out); while, when the plates are uniformly strong throughout, this pressure will, in all probability, cause a violent explosion. The fracture of a boiler may, therefore, by suddenly relieving the pressure, be the occasion of its explosion; its rupture occasioning this explosion.

2. *Electrical action.* Andraud maintains that by the evaporation of the water in the boiler, electricity is developed, which, under certain conditions, becomes capable of exploding. He therefore recommends the attachment of lightning rods to boilers. Jobard is of the opinion that the electricity produced by the evaporation is sometimes collected on the numerous brass tubes serving as flues, as in a Leyden jar, and so produces a most destructive explosion. Tassin, Wilke, Hofmann, Schiele and others also believe that electricity plays an important part in steam boiler explosions. These suppositions, however, all of them evidently overlook the important fact that the electricity which may possibly become free can collect only upon the outer surface of the boiler, and that this surface is never insulated. Moreover, it is not easy to see how it is possible for electricity itself to explode.

Lardner explained the explosion of a locomotive by attributing it to a stroke of lightning which so heated the boiler walls as to cause a sudden and violent evolution of steam, and so produced an explosion; a statement, the possibility of which may be questioned. Not more probable is the hypothesis of Wilder, that boiler explosions are caused by the suddenly setting free of caloric.

3. *Explosive gases.* Some years ago Perkins asserted that explosions were frequently caused by the decomposition of the water of the boiler into its constituent gases; and Mackinnon maintained that hydrogen was set free in the boiler by contact of the water with its highly heated walls; and that then, by opening the throttle valve, air is allowed to enter, which, mixing with the hydrogen, becomes ignited by the red hot plates and causes an explosion. Du Mesnil is of the opinion that hydrogen is set free by the decomposition in the boiler of water and oil vapor, and that this coming in contact with the oxygen contained in the feed water, forms an explosive mixture, which, being ignited by the plentifully generated electrical sparks, explodes and bursts the boiler. Schiele believes that electrical sparks are produced in the boiler by the ebullition—just as lightning is produced in the clouds—and that these inflame the mixed gases and cause the explosion. Jobard asserts that either water is decomposed by the ignited boiler plates, or that by the decomposition of the organic matter contained in the feed water, a sort of fire-damp is generated. If now the tube of the feed pump does not constanly dip below the surface of the water supplied to it, air is pumped into the boiler (!) and an explosive mixture of gases is thus formed; this, being ignited either by electric sparks or by the glowing organic matter within, causes the explosion of the boiler. Hipp even maintained that the formation and ignition of explosive gases is the sole cause of boiler explosions; but his arguments on the point have been satisfactorily answered by Grashof.

The investigations of a Commission appointed some time ago by the Franklin Institute of Pennsylvania, have shown that water contained in a red-hot boiler whose walls are clean but not polished, is not decomposed. And Schafhautl has proved that one volume of oxy-hydrogen gas will no longer explode, if mixed with 0·7 of a volume of steam. Parkes, indeed, states that an inflammable gas is evolved during the blowing off of a highly heated boiler, which on opening the manhole bursts into a flame; but, notwithstanding this, there can evidently be formed, during the hours of work, only the smallest possible traces of hydrogen. Even were large quantities of combustible gases evolved within the boiler, these would be so much diluted by the steam present, that even with a sufficient access of air and in presence also of ignited boiler plates—the hypothesis of electric sparks is completely absurd—an explosion of any magnitude is not to be thought of.

Wolf and Taylor assume as a cause, the explosion of gaseous products within the flues. If the stoker in charge, either at noon or at night, covers the glowing coal with a thick layer of slack or ashes, and closes the damper in the chimney, gases are formed, according to Jobard, which when the fire door is again opened and the fire is stirred, explode and destroy the boiler. Both Hanel and Wabner also emphasize the danger arising from such explosions in the fire passages.

That inflammable gases may collect in the flues, is a well known fact; but that the explosion of these gases is sufficiently powerful to tear in sunder the boiler, is very improbable. Nevertheless, under certain conditions, especially in connection with the causes mentioned under 1, 5, and 7, these gases may be the indirect cause of a boiler explosion. At all events, prudence demands that after an intermission in the work, the damper should first be opened, and then the fire door, so that in this way the explosible gases may be carried off.

4. *Spheroidal State.* Boutigny regarded the so-called spheroidal state of the water in the boiler as the chief cause of its explosion. A white hot metallic ball plunged into soap water becomes immediately surrounded with an envelope of vapor, and produces no hissing noise either at the time of immersion, or for some seconds afterward. But when this envelope of steam disappears from the ball by reason of its cooling, the water comes in contact with the hot ball, a sudden evolution of steam takes place, amounting almost to an explosion, and the vessel is generally shattered. A. W. Hofmann has transformed this inverted Leidenfrost's experiment into a beautiful demonstration for the lecture room. Barrett thinks that impure water in steam boilers takes the form of hollow (?) spheres; and that these exert, on bursting, a very strong tension. Normandy, indeed, believes that he has actually observed such a spherical condition of the water in a steam boiler. But it is very improbable, nevertheless, that such a phenomenon can occur frequently in a boiler, or can lead to its explosion.

5. *Superheated Water.* Dufour has shown that drops of water ten millimeters in diameter, enclosed in oil, can be heated to 175° C., without the formation of steam. He has proved, still further, that under diminished pressure considerable superheating may occur. Donny succeeded in heating water, free from air, under the ordinary pressure, to 135° C. The corresponding observations of Schmidt, Krebs, Tyndall, and Grager, are well known.

Dufour concludes from his experiments that, during the period when the machinery is still, the steam tension becomes lessened by the cooling of the steam space, while the water continues to maintain its high temperature. By agitation, by opening the throttle, and the like, a sudden almost explosive boiling takes place, accompanied with a tumultuous formation of steam, which may prove destructive to the boiler. Heinemann, Kirchweger, Ruhlmann and Reiche question the possibility of such superheating of the water. Werner, Frohning, Ludewig, Blum, Sheffler, Jacobi and Fuhst, Langen and Stuhlen, as well as Wittmann, on the other hand, maintain that it is entirely possible.

Since, moreover, Burnat and Mayer have actually observed considerable superheating of the water in steam boilers, the possibility of such superheating, especially when the water is oily, or is free from air, must be conceded. But whether a good boiler can be destroyed by this agency alone is entirely questionable. In conjunction with the causes mentioned under 1, 6 and 7, however, such an explosive kind of boiling may become the occasion of an explosion.

Donny proposed to prevent the superheating of the water by blowing a fine stream of air into the boiler. Stiehl's "explodicautor" acts by drawing up a small quantity of the water in the boiler and letting it fall again. Cohn has made some experiments upon the use of electricity for this purpose.

Williams asserts that liquid water always has the temperature of melting ice; the heat apparent in hot water being due entirely to particles of steam distributed through it. He believes, therefore, that if there be too much water in a boiler, an explosion may take place on opening the throttle. How absurd these suppositions are, has already been shown by Meidinger.

[To be continued.]

Prof. Boettger gives the following process for detecting iron in nickel salts. If a nickel salt contains a very small quantity of iron, which can scarcely be detected in the ordinary way, the following test will reveal it: Some of the salt solution is put in a test glass and slightly acidified; a few drops of sulpho-cyanide of potassium are added, and the whole shaken with a few cubic centimeters of ether. After standing a few minutes the strata of ether, which rests on the top of the solution, will have a rose-red color if any iron is present. To remove all the iron from such a salt the aqueous solution is acidified with nitric acid to convert the protoxide of iron into a peroxide, and then boiled for ten minutes with a few grammes of carbonate of protoxide of nickel. If the latter substance is not to be had, a few drops of a solution of carbonate of soda is added to the solution of the nickel salt, so as to precipitate some carbonate of nickel, then boiled violently for ten minutes, and finally filtered. The carbonate of nickel, Boettger says, precipitates every trace of iron, which is present in the solution as peroxide, in the form of a hydrated sesquioxide.

*A paper presented to the Hannover section of the Society of German Engineers. Translated by Chas. B. Dudley, Ph. D, of the University of Pennsylvania.

Special Notices.

Second-Hand Machinery Wanted.

1 Steam Boiler, 60 horse power.
1 Steam Engine, 40 to 50 horse power.
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Wanted.

A capable and energetic young married man wants employment in any business capacity, manufactory or salesroom, in New York or elsewhere. Has had some six years' experience in the Hardware business, and three years' in a manufactory of saws and machinery. References unexceptionable. Address, ***Salesman,*** 288 S. 9th St., Brooklyn, E. D., N. Y.

Wanted,

By an experienced man who has a large acquaintance with the wholesale and retail hardware and house-furnishing merchants thoughout the West, a position as traveling salesman. Can furnish good city references. Address, **P. A. C.,**
Office of The Iron Age, 10 Warren St., N. Y.

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A gentleman with a large acquaintance among Hardware Jobbers in the Eastern and Western States and Canada, is open for an engagement to travel for a manufacturing concern. Satisfactory reference given. Address, **Hardware,**
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A gentleman having some experience in the iron business, with best connections and large means, seeks an interest in some respectable firm. Banking or manufacturing preferred. Reply solicited only from those engaged in business which will bear the closest scrutiny.

Address, **A., Box 4250, P. O., N. Y.**

A Roller wants a situation as a steady and experienced workman on either guide, hoop or bar iron. Can turn rolls and take care of steam engines and machinery. For further particulars, address,
Boonton, N. J., Box 96.

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SPECIAL INDUCEMENTS.

We want a first-class agent in every county in the United States, and also in Europe, to sell the world-renowned Wilson Shuttle Sewing Machine, and the Wilson Manufacturing Machines, to whom we are prepared to offer Extraordinary Inducements. For full particulars, apply or address **Wilson Sewing Machine Co.,** 827 & 829 Broadway, N. Y.
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An iron worker of large experience in this country and England, with the best testimonials as to character and capacity, wishes an engagement as manager or foreman of a mill or forge. Has had 20 years' experience in the manufacture of bars, hoops, plates, sheets, and puddle steel.

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LABOR TO HIRE.

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Surplus - $1,800,000, Gold.

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FOR SALE in the best business part of Jersey City, a first-class ***Tool*** and ***Hardware*** business. Established about 25 years, and doing a fair business.

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NOTICE

Is hereby given that goods for the exhibition at Djocjakarta, Dutch East Indies, (see *The Iron Age,* Nov. 12, first editorial) will still be in time if shipped by steamer ROTTERDAM, December 24th.

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Separately or together, for Iron and Spikes required in the construction of a large Propeller for the Lake trade.

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DEEP RIVER, Conn., Sept. 7, 1874.

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Analysis of Average New Bed Pure Ore.		*Analysis of No. 1 Bessemer Pig.*	
Metallic iron	68·240	Undetermined matter and loss	·134
Oxygen with iron	26·010	Silicon	1·019
Water	·380	Carbon	3·821
Insoluble silicous matter	4·330	Phosphorus	·048
Sulphur, practically none		Sulphur, practically none	
Phosphorus	·038	Calcium	·140
Alumina	·280	Metallic iron	94·838
Lime	·140		100·000
Undetermined matter and loss	·592		
	100·000		

Witherbees & Fletcher,
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Furnace at FLETCHERVILLE, near Mineville, N. Y.

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Architect and Constructor of Charcoal Blast Furnaces. Plans, Specifications and Estimates of construction furnished upon application.
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Cash paid for all kinds of **Metals** and **Tools.**

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A situation as bookkeeper or cashier of an iron works, a hardware business, or in the coal trade, which the advertiser understands in all its branches. Highest references of character, capacity, &c.
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BLACKWELL & UTLEY,
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The well known property of the late
VAN ANDEN FILE CO.,
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Consisting of about one-quarter of an acre of good
One Story Brick Slate Roof Buildings,
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Two No. 6 Sturtevant Blowers. Two No. 4 McKenzie Blowers. One No. 6 Andrew's Centrifugal Pump. One No. 4 Turbinate Centrifugal Pump. Three No. 0 Cameron Pumps. One No. 2 Cameron Pump. One Knowle's Pump. One Earle Pump.
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C. KIRCHHOFF,
Commercial Editor "El Cronista,"
Box 2800, N. Y

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Dec. 9, 1874.

During the past week the condition of the financial markets has been more or less feverish, and but little activity has been reported. The money market has stiffened somewhat, and borrowers on call have had to pay as high as 4 @ 5 per cent. The discount rate on commercial paper, single names, is 6½ @ 10 per cent. Prime endorsed is quoted at 5½ @ 8 per cent.

The bank statement shows a heavy loss in the reserve. The statement was made on falling averages for both legal tenders and specie, and although it shows a reduction compared with the preceding week of nearly $6,000,000, does not fully reflect the loss during the week of either legal tenders or gold. In other words, the banks probably have at least $3,000,000 less reserve than reported. So far as the reduction in reserve is due to loss of legal tenders, the statement is, all things considered, encouraging, for it shows a healthy activity in the sections to which the currency is shipped. The following is a comparison of the bank averages for the past two weeks:

	Nov. 28.	Dec. 5.	Differences.
Loans	$282,285,600	$286,072,800 Inc.	$3,787,200
Specie	17,329,300	14,467,200 Dec.	2,862,100
Leg. Ten.	53,301,909	50,291,700 Dec.	2,020,200
Deposits	222,767,300	219,632,100 Dec.	3,135,200
Circulation	24,883,600	25,012,100 Inc.	128,500

The publication of the public documents during the week made no improvement, as they contained nothing which had not been anticipated by the newspapers. The impression prevails that Congress will take no important action with regard to the currency, or the financial recommendations of the President, during the winter session, and it is thought that but little important business of any kind will be acted upon.

The specie payments recommendations of the President had the effect of depressing the gold premium a little. On Thursday the Treasury sold $500,000 at 112·135 @ 112·2. The following table shows the highest and lowest daily range of the premium:

	Highest.	Lowest.
Thursday	112⅜	112⅛
Friday	112⅜	111⅝
Saturday	111⅜	111⅛
Monday	111⅜	111⅛
Tuesday	111⅜	110⅞
Wednesday	111⅛	110⅞

The price of government bonds has declined in sympathy with gold, but the quotations in foreign markets are steady. Railway mortgages are strong, as are investment shares generally. We give below the closing prices of governments.

In the stock market there has been a violent and feverish speculation, with Pacific Mail as a feature. The troubles in that corporation have resulted in the resignation of Mr. Russell Sage from the presidency, and the election of Mr. Alexander to his place. After Pacific Mail, the principal dealings have been in Western Union, Lake Shore, Northwest, Ohio and Mississippi, Wabash, St. Paul and Rock Island. The highest and lowest of to-day's quotations of active shares are given below.

The following tables show the movements of the week in foreign trade:

IMPORTS.

	1872.	1873.	1874.
Total for week	$3,943,596	$5,093,110	$5,517,786
Prev. reported	396,373,480	359,366,002	359,628,792
Since Jan. 1	$400,317,046	$364,459,112	$365,146,578

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils	50	$394
Brass goods	4	488
Bronzes	53	8,842
Chains and anchors	27	1,635
Copper		467
Cutlery	115	43,278
Guns	32	2,528
Hardware	45	7,640
Iron, pig, tons	751	17,479
Iron, sheet, tons	32	5,411
R. R. Bars	48	3,3[illegible]
Iron cotton ties	967	2,798
Iron, other, tons	181	8,911
Lead, pigs	809	5,844
Metal goods	261	29,224
Nails	10	248
Needles	8	5,398
Old metal		845
Platina	4	17,628
Per. caps	8	1,762
Saddlery	2	784
Steel	2,347	27,653
Spelter	230,500	10,726
Silverware	4	1,570
Tin, boxes	16,187	128,779
Tin, 2268 slabs	99,990	19,394
Wire	22	4,655

EXPORTS EXCLUSIVE OF SPECIE.

	1872.	1873.	1874.
For the week	$4 344,898	$5,170,064	$4,103,914
Prev. reported	246,659,065	277,179,045	265,218,046
Since Jan 1	$221,003,963	$282,349,109	$269,321,960

EXPORTS OF SPECIE.

Total for the week	$2,400,888
Previously reported	48,483,313
Total since January 1, 1874	$50,884,201
Same time in 1873	46,612,096
Same time in 1872	67,561,700

Government bonds at the close were steady at the following quotations:

	Bid.	Asked.
U. S. Currency 6's	116½	116⅝
U. S. 6s 1881, reg	115¾	116
U. S. 6s. 1881, con	119¾	120
U. S. 1862, 5-20 reg	112¾	112¾
U. S. 5-20 1862, con	112¾	112¾
U. S. 5-20 1864, reg	114¾	114¾
U. S. 5-20 1864, con	114½	114¾
U. S. 5-20 1865, reg	116¼	116¾
U. S. 5-20 1865, con	116¼	116¾
U. S. 5-20 1865, reg. new	115	115¼
U. S. 5-20 1865, con	118¾	118½
U. S. 5-20 1867, reg	115¾	116
U. S. 5-20 1867, con	119¾	119¾
U. S. 5-20 1868, reg	115¾	116
U. S. 5-20 1868, con	119¼	119¾
U. S. 10-40 reg	112¾	113
U. S. 10-40 con	113¾	114¼
U. S. 5s. 1881, reg	112¾	112½
U. S. 5s, 1881, con	112¾	113½

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated	102¾	101⅞
Lake Shore	80¼	79⅞
Rock Island	101½	101¼
Del., Lack. & Western	108¾	108¾
Michigan Central	82½	80½
Wabash	30¾	30
Harlem	131	131
Western Union Telegraph	83¼	82½
Atlantic & Pacific Telegraph	18¾	18¾
Northwestern	46⅜	45⅞
" Pref	61⅝	61½
Milwaukee & St. Paul	38½	38
Panama	114½	114½
Pacific Mail	40¼	39
Erie	27⅜	26⅛
Ohio & Mississippi	31⅛	30⅝
Union Pacific	35½	35⅛
C. C. & Ind. Central	10	9¾
Atlantic and Pacific, Preferred	16¾	16½
Missouri Pacific	47	47
Quicksilver	33¼	33¼
" Pref	44¾	44½
United State Express	64½	61½

GENERAL HARDWARE.

Although we cannot report anything like general activity in the trade, still there is a good deal doing in a jobbing way, and some of our city houses report a very satisfactory business for the past week.

The manufacturers of Carriage Bolts, &c., held a meeting in this city to-day. The chief business transacted was the election of officers. No change was made in either lists or discounts.

Trade in Foreign Hardware continues dull, except for a few special lines; thus, we notice a good demand for Joseph Rodgers & Sons' well known goods, and several other brands of fine Sheffield Cutlery are having fair sale. Hermann Boker & Co. have in stock a handsome line of Fish Carvers, Pearl and Ivory Handled Table and Dessert Knives, and sets of Childrens' Knives, Forks and Spoons in cases, all silver plated; also Nut Picks, Silver Plated Nut Cracks, and a general assortment of special goods suitable for holiday presents, of both English and domestic manufacture. These they offer to the trade at prices to suit the times. They have also purchased of the Biddle Mfg. Co. their entire stock of Cutting Nippers, Pruning Shears and Compasses, which they will sell at greatly reduced prices.

The demand for Nails continues fair for the season, but prices are weak and a trifle more in buyers' favor than at our last writing. We continue to quote 10d. at $3·50 @ $3·60, net, but for large orders a small concession from the former figure could be obtained.

The following circular was issued under date of 1st instant:

OFFICE OF THE KEYSTONE
SAW, TOOL, STEEL AND FILE WORKS,
Front and Laurel streets, Philadelphia.

The close of another business season rapidly approaches, and we desire to address our many valued customers on a topic which deeply interests both themselves and us.

We thank them for the honorable course they have pursued in the sale of our goods. There has been less complaint this season about breaking prices than for many seasons past, and we hope the same honorable and agreeable system may long continue.

We have lately visited some of the retail trade, not, however, to interfere with the jobbers, but to ascertain how well our interests were protected, and to introduce some new styles of goods. We are well aware that it is impossible for a salesman to carry samples of all articles he desires to sell. When new goods are introduced, we shall relinquish the trade, and the jobbers will then reap the benefit. The system of transmitting goods through responsible jobbers has given entire satisfaction. We have great pleasure in stating that the retail trade in general is better canvassed than we supposed, yet there are sections in which our goods are comparatively unknown; we found a few No. 7 Saws, but all others, such as common Hand Saws, Compass Saws and Buck Saws were of other manufacture.

By a little more effort on the part of the salesmen traveling in these sections, this trade can readily be turned to our account, and justice demands it should be secured for us. Salesmen may say that similar goods of other makers are cheaper than ours; in answer to this, we guarantee to manufacture and furnish as good an article, at the same price, as any manufacturer dare offer; we would say at a less price, but there must be a margin for the jobbers' profit; when this is taken into consideration, together with the fact that the majority of Saw manufacturers sell direct to the retail trade, it will readily be seen that it must be close work for us. Let your salesmen send us samples, with price of any goods they find in the market, and we will put them in position to compete. We make this reasonable request that the jobbers shall push our goods to the utmost, and we guarantee to make it profitable to them.

HENRY DISSTON & SONS.

Henry Disston & Sons inform us that it is not their intention to make any change in their list or discounts for the ensuing season.

John Rothery's Hand Cut Files, so long and favorably known to the trade, are offered by the agents, Walsh, Coulter & Flagler, at $5 to £, currency.

The Walden Knife Co. have recently added to their already fine assortment of Spring Cutlery some new and attractive patterns, suitable for holiday trade. They offer these goods, which will compare favorably with any similar goods of either foreign or domestic manufacture, at discount 30 per cent. from list. Their list for regular patterns of Pocket Knives corresponds with those of the leading makers of similar goods. Walsh, Coulter & Flagler, No. 83 Chambers street, are their agents in this city.

George B. Walbridge has in stock a full assortment of Shoenberger's Horse Shoes; also all sizes of Washoe Railroad Picks.

The Union Nut Co., No. 78 Beekman street, have been appointed agents for the Locks of the American Lock Company, of Cazenovia, N. Y. These goods are all furnished with the small flat key, which has become so popular. Their list comprises Store Door Locks, Night Latches, Solid Bronze Pad Locks, Drawer, Desk, Box Locks, &c. The goods are well finished and fitted, and are offered to the trade at discount 25 @ 30 per cent. from list, according to quantity.

Pugsley & Chapman, No. 6 Gold street, quote their Canal Wheelbarrows, new list, discount 10 per cent., and Coal, Garden and Stone Barrows discount 25 per cent. Their advertisement will be found on the 36th page.

The manufacturers of Wrought Iron Pipe held a meeting in Pittsburgh on the 3d instant, when the following revised list was adopted. This list is subject to discount 30 @ 35 per cent., according to quantity:

WROUGHT IRON WELDED TUBES FOR GAS, STEAM AND WATER.

Inside Diam. Inches.	Price ℔ Ft., Plain. $	Price, ℔ Ft., Galvanized. $
⅛	·04	
¼	·04	·08
⅜	·05	·08
½	·06	·11
¾	·08	·13
1	·11	·18
1¼	·18	·27
1½	·25	·36
2	·34	·48
2½	·54	·77
3	·67	1·00
3½	·90	1·30
4	1·10	1·60
4½	1·40	2·00
5	1·65	2 35
6	2·25	3·50
7	3·25	...
8	4·50	...

BRITISH IRON MARKET.

(Specially reported by cable for The Iron Age.)

WEDNESDAY, Dec. 9, 1874.

Scotch Pig.—The market is quiet, the demand having fallen off, and prices are declining. Little business has been done. The following are maker's quotations:

Gartsherrie No. 1	95/
Coltness No. 1	100/
Glengarnock No. 1	94/
Eglinton No. 1	86/6

Manufactured Iron.—The market remains in about the same condition as when last reported. Best Staffordshire Bars are quoted £9. 15/ @ £10. 10/.

Rails are unchanged.

IRON.

American Pig.—During the past week the market has been drooping, and sales have been made at lower prices. Most of the Lehigh companies have been asking $26 for No. 1 Foundry, while some of them asked $27. The Thomas Iron Company to-day reduced their price to $25, but we do not know of any other company which has yet made that their nominal price. We note, however, sales of 300 tons and 100 tons good Lehigh No. 1 Foundry at $25, and 50 tons No. 2 Foundry at $23·50. The Thomas Iron Company have to-day taken orders for 7500 tons for next year at prices ruling at time of delivery. We quote: No. 1 Foundry, $25 @ $26; No. 2 Foundry, $23 @ $24; and Gray Forge, $20 @ $23.

Scotch Pig.—The season is now come when the demand naturally falls off, and prices are weaker. Transactions have been very limited. Our cable advices from Glasgow show a slight decline there. We quote here: Coltness, $40 @ $41; Glengarnock, $37 @ $38; Eglinton, $36 @ $37.

Bar.—There is no improvement in this department of the trade, though if the Pittsburgh strike should be of long duration it will stiffen the prices of Eastern mills, which are still nominally 2·8 cents. We to-day reduce the price of Iron from store in this city. A table of these prices will be found on our 27th page.

Rails.—We hear of no transactions to report, and quote as before: American, $48 @ $53, currency, at works; and Welsh, $47 @ $50, gold.

Old Rails.—The price is about $28 @ $30, but there have been no recent sales.

Scrap.—There is nothing doing in Scrap, which we quote $28 @ $30. It is doubtful if a lot forced on the market would find a buyer at $28, but many of the holders would not sell at $30.

METALS.

Copper.—Sales for the week have not exceeded 200,000 pounds Lake, cash, at 23¼c. The asking price for Copper on the spot is 23⅝c. @ 23¼c., while not above 23c. @ 23¼c. is bid. Most of the large consumers have had to receive considerable amounts of Copper of late, and to provide funds to pay for them; there is consequently no anxiety to purchase beyond immediate requirements, hence the temporary dullness, not to say weakness, in the article on the spot, scarce though it may be. But we are accustomed to dull times in the month of December, and even the greater portion of January. The good position of Copper on this side is not impaired thereby. Baltimore is nominally worth 22⅝c. @ 22¾c. Lake futures are as strong as ever at 24c., February delivery; their strength proves that the metal trade's good opinion of Copper is unaltered. English telegrams are dated 4th instant, when Best Selected stood £97, and Chili Bars were £86. 10/, while the day subsequent the latter were cabled £86. This is a decline of £3 from the highest point in November. The Lake Superior *Mining Gazette*, of Houghton, gives the details of the movement of Ores. The Portage Lake District sent down, since the opening of navigation, 17,575 tons, against 15,195 in 1873, the Calumet and Hecla mine producing 12,948; the Quincy, 1813; the Atlantic, 903, while the remaining 1911 tons were made up by eight other mines. The Keweenaw Point District sent forward from ten mines 4113 tons, against 2782, and the Ontonagon 638, against 537, from twelve mines, making a total of 22,326 tons this year, against 18,514 in 1873. In order to prevent erroneous impressions, it should be here remarked that the amount sent forward this year included some 3000 tons retained from the previous year's production, that had been shut up in those localities by the early close of navigation. Manufactures of Copper are steady at the following quotations: New Sheathing, 28c.; Bolts and Braziers, 30c.; Bronze and Yellow Metal Sheathing, 21c. @ 22c., and Yellow Metal Bolts, 28c., net cash.

Tin has been quite inactive, although it continues to be firmly held, the nominal quotations being 23½c. for Straits, while English L. and F. is held at 21¾c.; ditto, Refined at 21¾c., and Banca at 26c., all gold. The asking rate for Straits, to arrive, is 22c., gold. Trade has been confined to a mere jobbing business for the week. Cable accounts came to hand dated Singapore, Dec. 3d, and announcing the shipment in Nov. of 250 tons Malacca Tin to New York, and 50 to Boston, and quoting $25 per picul, which is equal to 22c. @ 2¼c., gold, laid down here. At the same time it is not easy to procure orders here for Singapore at limits exceeding 21c., gold, owing to the temporary dullness which usually prevails here at this time of the year. But this may undergo a favorable change as soon as we shall have fairly entered the new year. The sudden stir which has been created in the Tin Plate business may, after a while, set Tin also going once more, and change the entire aspect. Telegrams from London have been steady throughout the week at £93 for Straits, and £99 L. and F. In Tin Plates we have had pretty much the most active week of the season, sales on the spot and "to arrive" summing up no less than 20,000 boxes. It having been ascertained that the country at large had run low in stock, a vigorous movement was set on foot, and resulted in the above transactions. Large buying, we hear per cable, is still going on in England for American accounts, the precise extent of which is as yet unknown, but, of course, the English market has sympathized at once with our own, nor have we apparently seen the highest point yet among ourselves. The sales were at $9·37½ @ $9·75, gold, per box, for I. C. Charcoal, now firm at the latter figure for ordinary brands, while Charcoal Terne sold at $8·37½ @ $8·50, gold, $8·62½ now asked for ordinary brands; I. C. Coke at $7·50 @ $7·75, now $7·87½, the lowest figure, and Coke Terne at $7 @ $7·25, now firm at the latter quotation; all gold.

Lead.—European accounts continue favorable, and even more animating than heretofore, common English commanding £23. 15/ to £24 at London, but not even foreign is much benefited by news of the kind, and we quote the same 6¾c., gold, as heretofore, without anything done, although some holders and receivers have been endeavoring to establish the figure 6·85c., gold, on account of its momentary scarcity. The sales of domestic have been confined to 190 tons for the week, 50 of which at 6·20c., gold, and the remainder in small lots at 6·25c., gold. Domestic is quite weak. Of Selby another 150 tons have arrived, and also gone into store; the asking price for this description of Lead remains 6·35c., gold, while the government, at the same figure, is also out of the market, nor is the latter likely to do anything till early spring. It would have been injudicious, or, rather, useless, had this government Lead been pressed on an unwilling market. The manufactures of Lead are sustained on the basis of 8¾c., less the usual discount to the trade.

Spelter and Zinc.—Nothing has been done in foreign Spelter, which remains firm at 6¾c. @ 7¼c., gold, for Silesian. No news of special interest is to hand from Europe with reference to this metal. Although some news has been circulated to the effect that some of our Western smelting concerns had suspended operations, we have been unable to trace the intelligence to a reliable source, and find Domestic Spelter from first hands quiet, and not likely to bring upward of 6¾c., currency, while the present dullness prevails, which has settled upon this metal and Lead more than any other, both consumers and dealers declining to increase supplies at a time when they take stock and square their books. Sheet Zinc, on the other hand, with light stocks and a good demand, is tending upward, 9x36 being held at 9¼c. @ 9½c., gold, while other sizes can still be had at 9c., gold.

Antimony.—London is £51. There is a fair stock here; the asking price is still 12½c., gold, but it can be had at 12¼c., gold.

COAL.

There is no material change to note in price or demand in the Coal trade this week. Consumers are only buying when compelled from urgent necessity. The system of season contracts adopted by the combination during the current season has many objections, and is giving much trouble to the trade at the present moment. It would not be at all surprising if some other plan were adopted for the coming season. The furnace owners in the Lehigh Valley had a meeting on Wednesday last, and will meet again on the 10th of this month (to-day). It is expected there will be a stoppage of production. This will cripple the Coal men who were at work on the orders for this industry. The fiscal year of the Philadelphia & Reading Railroad Company, Schuylkill Canal, Lehigh Valley Railroad and the Lykens Valley trade closed on the 30th of November.

We can now give a tolerably fair estimate of the decrease in the supply of Anthracite Coal this year compared with last year, which will be in the neighborhood of about 850,000 to 900,000 tons. The decrease in the supply of Bituminous from this region embraced in our table is 31,101 tons; but the decrease in the supply of Bituminous Coal in 1874, throughout the country, will be nearly, if it is not quite, 1,500,000 tons. This trade has suffered more severely in the West than in the East.

The supply from the different regions, compared with last year, is as follows:

	1873.	1874.	Dec.
Via Schuylkill	4,513,963	4,420,815	92,148
" Lehigh	6,658,066	5,449,280	208,786
" Wyoming	7,340,667	6,645,840	594,827
" Shamokin	595,363	550,143	45,255
" Lykens Valley	453,745	447,767	5,978
Bituminous Coal	3,112,158	3,084,057	31,101

The market for Bituminous continues very quiet, and prices remain unchanged. We quote: Cumberland, $6·25 @ $6·75; West Virginia, $7·25; James River Steam, $6·25; James River Carbonite, $9; Kanawha House, $14·25; American Cannel, $13; Pennsylvania and Westmoreland, $7·65; Murphy Run, $7·40; Newburg Orrel, $7·50; Sterling Ohio, $12.

The demand for Foreign is limited, and prices remain as last reported. The quotations are: Liverpool House Cannel, $17 @ $18; Liverpool Gas, $10; Newcastle Gas, $7·50 @ $8; Scotch, $9; Ince Hall, $17 @ $18.

The Coal transported over the Cumberland Branch Railroad, during the week ending Dec. 5, 1874, amounted to 7163 tons, as against 3874 tons shipped in the corresponding period of last year, showing an increase of 289 tons. Over the Cumberland and Pennsylvania Railroad, for the same period, the shipments were 29,333 tons, against 32,991 tons shipped in 1873, a decrease of 3657 tons.

The total amount of Cumberland Coal transported for the week ending Dec. 5 amounted to 39,068 tons. The supply sent from all the regions previously amounted to 2,206,850 tons, making the aggregate amount shipped so far this year 2,245,918 tons.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending December 8, 1874:

Hardware.

Anderson, Merchant & Co.
Files, cks., 10
Bryce Wm. & Co.
Cases, 3
Chains, cks., 10
Clark Andrew & Co.
Cases, 4
Fleisch A. & D. & Co.
Cases, 1
Frasse P. A. & Co.
Casks, 1
Field A. & Co.
Mdse. pkgs., 16
Anvils, 60
Friedmann & Lauterjung
Razors, cs., 2
Cutlery, cs., 9
Horton John,
Cases, 11
Hildick A. H.
Vises, cks., 2
Laughland & Co.
Wire, cks., 4
Moore's J. P. Sons,
Arms, cs., 15
Merchants' Dispatch Co.
Arms, cs., 7
Star & Marcus,
Cases, 1
Schoverling & Daly,
Arms, cs., 4
Cases, 3
Seymour W. N. & Co.
Casks, 2
Tomes F. & Co.
Cases, 1
Van Nest A. R. & Co.
Packages, 2
Van Wart & McCoy,
Chains, cs., 1
Chains, cks., 8
Packages, 8
Mdse. pcs., 1
Chains, 10
Curry combs. cks., 1
Nails, cks., 1
Anvils, 67
Wiebusch F.
Chains, 8
Chains, cks., 44
Files, cks., 1
Anvils, 75
Packages, 3
Order.
Casks, 2
Files, cks., 13
Cases, 9

Iron.

Brown Bros. & Co.
Bars, 2336
Dale John G.
Sheet, bdls., 85
Hardy A. & Co.
Scrap, tons, 54½
Henderson Bros.
Pig, tons, 300
Jex Wm. & Co.
Scrap, lots, 1
Laughland & Co.
Hay bands, bdls., 600
Phelps, Dodge & Co.
Sheet, bdls., 201
Whitney A. R. & Bro.
Bars, 216
Order.
Pig, tons, 400
Wire, bdls., 191
Boxes, 830

Steel.

Brown Wm.
Cases, 35
Bundles, 142
Dale John G.
Bundles, 80
Hogan John,
Bundles, 11
Cases, 25
Casks, 1
Moore Henry,
Cases, 7
Naylor & Co.
Cases, 28
Tires,
Tyng & Co.
Bars, 79
Woodford W. O.
Cases, 117
Bund'es, 12
Order.
Rods, bdls., 128
Bundles, 255
Cases, 17
Bessemer rods, bdls., 139

Metals.

Bruce & Cook,
Tin plates, bxs., 215
Byrne Joseph & Co.
Tin plates, bxs., 440
Dale John G.
Tin, bxs., 2116
Hoadley & Co.
Copper, pcs., 6
Jex Wm. & Co.
Scrap, metal, pkgs., 5
Phelps, Dodge & Co.
Tin plates, bxs., 7715
Tin, ingots, 1107
Tin, slabs, 500
Rivera J. de & Co.
Scrap, copper, bbls., 5
Order.
Lead, pigs, 4709
Tin plates, bxs., 908

OLD METALS, PAPER STOCK, &c.

The Old Metal market still continues unimproved, the demand being light, and stocks are abundant, but prices, however, remain unaltered. The only change we have to note this week is in Grass Rope, which has declined from 1 to 1¼ cents per pound. The Paper Stock market has been more active than for some time past, and dealers have disposed of a considerable quantity of their accumulations. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 4c.; Zinc, 4½c. @ 5c.; Pewter, No, 1, 19c.; do., No. 2, 8c. @ 12c.; Spelter, 5c. @ 5½c., Wrought Iron, 1¼c.; Sheet do., ½c.; Cast, do., ½c. @ ¾c.; Machinery, do., ¾c.

Rags, &c.—Canvas, Linen, 5c. @ 5½c.; do. Cotton, No 1, 6c. @ 6¼c.; No. 2, 2½c.; White, No. 1, 6c.; No. 2, 4c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 4½c. @ 5c.; Gunny Bagging, 1c.; Jute Butts, 1¾c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½ @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2c. @ 2½c.

PHILADELPHIA.

PHILADELPHIA, Dec 8th, 1874.

The only feature of novelty in the market is the lockout at Pittsburgh, and its probable effects upon both the Pig Iron and Finished Iron trades. From present appearances the suspension of boiling is likely to be protracted for weeks, and possibly for months. The natural effect of this, inside of the trade, will, it is believed, be to still further depress the prices of Pig Iron, and cause the blowing out of most of the furnaces looking to Pittsburgh for a market for Mill Iron, and to advance prices for Scrap Iron and Old Rails and Muck Bar, while it may possibly stimulate production of Bar Iron at Eastern mills. It is, of course, too soon to note any such effects yet, and with the very small demand current none such may be noticeable. The meeting of furnace men to curtail production will be held on the 10th, and result, probably, in little benefit to the trade. The transactions of the week are of moderate amount, and no disposition appears to exist to increase them, at least until after the new year. Prices are entirely nominal, as quoted, and we hear of such offers as the run of furnace for $22, without takers. We quote:

PIG IRON.—No. 1 Foundry, $26 to $28; No. 2, $23 to $24; Gray Forge, $22 to $23; White and Mottled, $18 to $20.

BAR IRON.—2·8c., nominally.

RAILS.—$53 to $60.

OLD RAILS.—$29 to $30.

SCRAP.—$28 to $30, for No. 1 Wrought.

The sales include, in addition to some 2000 tons Foundries at $26 and $24, respectively, 2000 tons Gray Forge at a very low figure; 1000 tons of Light Rails for the Pacific Coast; 2000 tons Muck Bar for California delivery; 400 to 500 tons Old Rails equal to $29.

PITTSBURGH.

PITTSBURGH, Dec. 8, 1874.

PIG IRON.—Business, to use a common phrase, is almost entirely played out, and there is not much prospect, at this writing, of an early change for the better. Until the negotiations which have been pending between the manufacturers and puddlers for several weeks, have been concluded, and some definite understanding arrived at, trade will continue to drag, as the mills will buy no more than they can possibly help until this matter has been finally settled. The reported sales for the past week were less than *three hundred tons*, which demonstrates pretty conclusively, what has already been stated, that business in the way of selling Pig Iron is almost suspended. And even if the hitch between the puddlers and manufacturers should be amicably adjusted, it is not likely that there will be, for the present at least, any decided improvement in the demand for pig, as in the present condition of trade manufacturers will buy no more than they can possibly avoid until January, when it is the custom, with the great majority of them, to stop a couple of weeks to take stock and make repairs. And even then there is no certainty that the hand-to-mouth policy will be discarded, as it is not to be expected that the mills will buy more than is sufficient to meet their immediate wants as long as there is no prospect of an advance or a probability of prices going still lower. To say the least the outlook is anything but encouraging to the producing interest. If the production could be entirely stopped for three or six months, so as to reduce the very large stock, there would be some chance of getting prices back to a point that would yield some little margin for profit, but as long as the supply is kept up to anything like what it is now, or has been during the past couple of years, and increasing, it is not reasonable to expect any improvement in prices; on the contrary, they will go still lower.

No. 1 Foundry	$27 00 @ 28·00—4 mos.
No. 2 Foundry	25·00 @ 26·00—4 mos.
Gray Forge	24·00 @ 24·50—4 mos.
White and Mottled	22·00 @ 23·00—4 mos.
Hot Blast Charcoal	30·00 @ 35 00—4 mos.
Cold Blast Charcoal	40·00 @ 50·00—4 mos.
Charcoal Blooms	70·00 @ 80·00—4 mos.

MANUFACTURED IRON.—The market for finished Irons continues slow, as it usually is at this season of the year, and no material or permanent improvement can reasonably be expected until after the close of the year. While some of the mills are reputed as being pretty well supplied with orders, these are the exception, not the rule—the best evidence of which is that the most of them are working single turn. What will be the result in case the puddlers refuse to accede to a reduction in wages, it is impossible at this writing to foretell. It is asserted by some that a general suspension will follow, but it is also rumored that some of the mills are so situated—we refer to those having orders ahead of their production—that they cannot afford to stop, and that rather than do so they will withdraw from the association. Prices continue weak, but so unsettled that it is impossible to quote with any degree of correctness.

NAILS.—The Nail market continues dull, and devoid of any new or important features to which reference has not previously been made. Orders are coming in very sparingly, as is usually the case at this particular time, and our manufacturers do not expect any material or permanent improvement until about the middle of January, when the spring trade usually opens up. Prices are nominally unchanged.

STEEL.—The demand for all kinds of Steel continues light, and trade is dull—more so than it has been at any time this year, if not since the panic; and while some of the mills are running full, the majority of them are not, and prices continue weak and irregular—so much so that it is difficult to give quotations.

CLEVELAND.

Messrs. READ & DICKEY, Iron Brokers, under date of Dec. 7, write us as follows:

PIG IRON.—A recent examination of stocks of Charcoal Iron on hand here has led to the discovery that stocks are very much smaller than had been supposed. A late sale of 5000 tons of Bessemer Iron has reduced the amount left in stock to less than 12,000 tons, Nos. 1 and 2, inclusive. This can only be accounted for on the grounds that the very low prices so long current have induced consumers to use more Charcoal Iron, both for foundry and mill purposes, than usual, it being considered fully as cheap as Bituminous Irons, in view of its better yield, owing to the excess of cinder used in making the latter. This demand is known to have existed, but no one was prepared to find that the aggregate of those small sales would have had such an effect on the stocks. In view of the foregoing, holders of Charcoal Iron are much encouraged, and a much better feeling is noticeable. Bituminous irons are still on the down grade, and if the policy of the mills, in closing, continues, or is not followed by an equal reduction in the furnace product, the lowest figures of the year have not yet been attained. Quotations are about as follows:

CHARCOAL PIG IRON FROM L. S. ORE.

Nos. 1 and 2	32·00—4 m.
No. 3	33·00—4 m.
No. 4	34·00—4 m.
No. 5	36·00—4 m.
No. 6	38·00—4 m.
Bessemer Metal, Charcoal	$31·00 @ 32·00—4 m.
Bessemer Metal, Bituminous	28·00—4 m.

BITUMINOUS PIG IRON FROM L. S. ORE.

No. 1 Foundry	$27·00—4 m.
No. 2 Foundry	25·00—4 m.
No. 1 Gray Forge Open Red Short	25·00—4 m.
Close " or Neutral	24·00—4 m.
White and Mottled	22·00—4 m.

FOUNDRY IRONS FROM BLACK BAND AND NATIVE ORES.

Massillon No. 1	$32·00—4 m.
Massillon No. 2	30·00—4 m.
"New Gartsherrie" No. 2	32·00—4 m.
Muck Bar	$44·00—60 days.
Iron Rails, according to section	$56·00 @ $60·00—cash.
Steel "	85·00—cash

MANUFACTURED IRON.—The future course of prices is at present somewhat problematical, as owing to the reported closing of the Pittsburgh mills to-day the production will be somewhat checked. A number of well informed people expect the price to revive from this fact, but we think the weight of opinion is toward the opposite result. Everything points at present toward lower figures for whatever enters into cost of production from ore to labor, and it is positively known that even if the present strike or lock-out should last any length of time, there will be enough needy manufactures running to supply the present light demand at what is the dullest season of the year. Any reduction in labor will make equal reduction in price of finished Iron, in spite of the fact that the labor reduction proposed is already necessary to equalize cost, and it is therefore the opinion of good authorities in the trade, that now that the conflict has commenced, labor will have to make more concessions than at first asked, before it is again employed. The stoppage of the mills at present only extends to puddlers, as most of them have considerable stocks of Muck Bar on hand, but in doing so they cut off the only market for Pig Iron, which will, therefore, decline still further, and is an additional reason why we may expect lower rather than higher prices.

BOSTON.

BOSTON, Dec. 5.—Pig is in an anomalous condition, and more than ever perplexing, while holders are discussing the possibilities of less stock in the market as each week passes, and are apparently certain that prices have touched bottom. We gather creditable reports that our quotations $31 @ $33 for No. 1, and $28·50 @ $31 for No. 2, are nearly nominal, and that from $2 @ $3 a ton less is the real basis for transactions. It may not be that the fanciest brands are selling at these figures, but that good No. 1 at $28 and good No. 2 at $26, on the wharf, are the paying prices of some of our most reputable foundries is not gainsaid. There are a few of the foundrymen, and here and there a dealer, who are buying iron and piling it up for the coming spring and summer's uses. They are known to use only the best brands; whether they buy at less than the above figures is discussed. We note a cargo of 700 tons Scotch Pig to arrive, which will go into bond. *Bar* is nominally unchanged, and though in reality barely as strong as a week ago, sales are made at from 2½c. @ 3c per pound, as to quality and grade, with occasionally, as last suggested, a shade made on these prices, possibly 2¼c. will cover the outside range on the best stock. *Steel* is having a small trade, with rather a steadier temper for machinery at 9½c. @ 10c.; warranted American Tool, 15c. @ 15½c.; Choice English Tool, 17c. *Copper* is a trifle more speculative, especially in futures, which have been advanced 1½c. during the week, and hold buoyant at 2c. In spots there is very little doing; the quotations remain at 23c. with holders asking ½c. @ ¼c. more, but not making sales. We quote New Sheathing, 28c.; Bolts and Braziers, 30c.; Yellow Metal Bolts, 28c. *Lead* is firm and dull. We quote Sheet and Pipe 8¾c., currency; Tin Lined Pipe, 16½c.; Bar lead, 8¾c. less usual trade discount; Pig, 7½c. for foreign, gold, and 6½c., currency, for domestic. *Spelter* is selling in a trifling way for American at 6¾c., currency. *Tin* is strong but quiet. Pig is tending upward. We quote Straits 22½c.; Refined English, 21¾c. @ 22c., gold. Charcoal I. C., $11·25 @ $12·50; Coke $9 @ $10; and Terne at $8·50 @ $12·50 per box, currency.—*Commercial Bulletin.*

CINCINNATI.

Messrs. L. R. HULL & Co., under date of Dec. 7, write us as follows: PIG IRON.—The demand is moderate for immediate consumption, with little variation in prices. Buyers generally do not anticipate any hardening tendency, at an early date, and are not disposed to buy except sparingly.

HOT BLAST CHARCOAL.

Hanging Rock	No. 1	₱ ton	$29·00 @ 30·00—4 mos.
" "	No. 2		27·00 @ 28·00—4 mos.
" "	Forge		25·00 @ —4 mos.
Tennessee	No. 1		28·00 @ 29·00—4 mos.
"	Forge		25·00 @ —4 mos.
Alabama	No. 1		28·00 @ 29·00—4 mos.
Missouri	No. 1		29·00 @ 30·00—4 mos.
"	No. 2		26·00 @ 27 00—4 mos.

HOT BLAST STONE COAL.

Missouri	No. 1	₱ ton	$28·00 @ 29·00—4 mos.
"	Forge		26·00 @ 27·00—4 mos
Ohio	No. 1		26·00 @ 28·00—4 mos.
"	Forge		24·00 @ 25·00—4 mos.
Scotch Pig, No. 1			

COLD BLAST CHARCOAL.

Hanging Rock	Car Wheel	₱ tn.	$38·00 @ 50·00—4 mos.
Missouri	" "		43·00 @ 45·00—4 mos.
Kentucky	" "		40·00 @ 40·00—4 mos.
Tennessee	" "		36·00 @ 42·00—4 mos.
Georgia	" "		40·00 @ 42·00—4 mos.
Alabama	" "		40·00 @ 42·00—4 mos.
Machinery and Forge			40·00 @ 42·00—4 mos
Blooms			75·00 @ 90·00—4 mos.

LOUISVILLE.

Mr. GEO. H. HULL, under date of Dec. 7, writes us as follows: The market is without quotable change. Purchases are confined almost entirely to lots needed for immediate use. The usual time, four months, is allowed on the quotations below:

HOT BLAST CHARCOAL.

No. 1 F'dry, from	Hanging Rock Ores		$28·00 @ 32·00
" 2 "	" "	"	26·00 @ 27·00
" 1 Forge,	" "	"	24·00 @ 25·00
" 1 F'dry, from	Tennessee Ores		26·00 @ 28·00
" 2 "	" "		25 00 @ 26·00
" 1 Forge,	" "		23·00 @ 25·00
" 1 F'dry, from	Alabama Ores		26·00 @ 28·00
" 1 "	" Mountain Ores		30·00 @ 32·00

HOT BLAST STONE COAL.

No. 1 F dry, from	Missouri Ores		30·00 @ 32·00
" 2 "	" "	"	28·00 @ 30·00
" 1 Forge,	" "	"	27·00 @ 28·00

COLD BLAST CHARCOAL.

Car Wheel from	Hanging Rock Ores		40·00 @ 50·00
" "	Tennessee Ores		36·00 @ 40·00
" "	Alabama Ores		40·00 @ 43·00
" "	Georgia Ores		40·00 @ 43·00
" "	Missouri Ores		38·00 @ 42·00
" "	Kentucky		35·00 @ 43·00

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, South Charles and Lombard streets, report us the following prices under date of Dec. 8: Trade rules about as reported for some time past. The demand is inactive, and prices have a drooping tendency. We quote the list unchanged, but weak.

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick.. } 1 to 4½ wide by 1½ to 2 thick }	2·8-10 to 3 cts. per lb.
Round and square, ordinary sizes, from ⅜ to 2 inclusive	2 8-10 to 3c. "
Hoop Iron, 1½ wide and upward	4½ to 4¾c. "
Band Iron, from 1¼ to 4 in. wide	3¾ to 4¼c. "
Horse Shoe Iron ¾ to 1 wide by ⅜ to ⅝ thick	4½ to 5c. "
Norway Nail Rods	7¾ to 8¼c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	16½c. "
Machinery Steel	11½c. "
Cast Spring Steel	10½c. "
Homogeneous Steel Plate	13c. "
Perkins' Horse Shoes, per keg of 100 lbs.	$5·87½
" Mule Shoes " "	6·87½

Common Horse Nails, from 14c. to 18c. per pound.

	10	9	8	7	6
Putnam Horse Nails	23	24	25	26	28c. per lb.
	10	9	8	7	6
Globe Horse Nails	23	24	25	26	28c. per lb.

R. R. Spikes 5¼ by 9-16 at 3¼c to 4c. per lb.

Messrs. HOFFMAN, THOMPSON & Co., Iron commission merchants, 23 and 25 South Frederick street, under date of Dec. 8, report the Pig Iron market as follows: We have to report a further decline in Charcoal Irons. Anthracites dull and without change. Prices nominal.

Baltimore Charcoal Pig Iron			$34·00 @ 36·00
Virginia	"	"	33·00 @ 35·00
Alabama	"	"	30·00 @ 32·00
Anthracite	No. 1		27·00 @ 28·00
"	No. 2		26·00 @ 27·00
"	No. 3		24·00 @ 25·00
White and Mottled			18·00 @ 20·00

FOREIGN.

FRANCE.

(*Moniteur des Interets Materiels.*)

PARIS, Nov. 22, 1874.—*Metals.*—The European metal markets have remained steady; prices have, on the whole, undergone little, if any, alteration. The higher discount rate determined upon by the directors of the Bank of England has had but little effect, nor do we believe that even a higher rate would cause any material decline in values, inasmuch as throughout the year a conservative course has been pretty generally followed, and overtrading avoided in most countries, though less so in England, perhaps, than on the Continent. We may pronounce the markets in a good condition, with a fair prospect before us. *Copper.*—Recent Chili charters are much below the usual average, and the production of that country is by no means excessive, although we calculate that up to the date of the last advices the production in Chili this year is 2500 tons more than last year. The shipments thence, up to the end of August, were 3800 tons in excess of those of the same period in 1873. Although from all other sources, except Cornwall, the supplies have similarly increased, and the English import, up to Oct. 31, exceeded last year's by 2600 tons, while the export was but 400 larger, the stocks in England, on the 1st instant, were 9400 tons less than at the commencement of the year. During the first ten months of the current year there were exported from England, under the head of manufactures of Copper, £456,750 more than during the corresponding period in 1873. The bulk of this, we may safely assume, has been Copper in the shape of cartridges; while, therefore, we have imported largely on the Continent of manufactured Copper, our imports of the raw material for the identical purpose of cartridges has also been largely in excess of former years, and taking together the many items belonging to the consumption of arsenals, and of which this metal forms the principal ingredient, the extensive consumption we have been witnessing is easily accounted for. It is at the same time a well known fact that manufactures of Copper never rise as fast as the raw material; thus while Chili bars commanded £74 on the 1st May, and manufactured Copper £92, the former had risen to £87 on the 1st instant, while the latter was only worth £98. This difference is mainly due to the circumstance that Chili bars are a speculative article, and fluctuate widely, while manufactured Copper is less mercurial, and follows but slowly in either direction. The available supply of fine Copper at Liverpool and Swansea was but 10,900 tons on the 15th inst. against 21,100 a year ago, and 21,100 and 15,400 in 1872 and 1871. Prices in India have advanced and exchange has improved. While we have thus endeavored to point out the salient features in the European and especially English Copper situation, we have been getting on satisfactorily here, and quote, on a firm market, Chili Bars, 235 francs; common ditto, 230; Ingots, 243; English Tough Cake, 242·50, and pure Corocoro Ore, 230. Old Copper has also risen considerably. There is not much doing at Havre, but prices follow closely the English fluctuations. Marseilles is also higher. *Tin* has quieted down in Holland, in consequence of the near approach of the auction. Banca there has been done at 58¼, and the asking price is now 58¾ guilders; all on the spot. Similar influences have been at work in England, where the market has been dull at £93. 10/ to £94 for Straits. We have kept steady here at 265 francs for Banca, here or at Havre, 250 Straits. Marseilles has been quite firm at 245 for Straits and Billiton. English *Lead* has improved to £23. 15/ at London, holders being unwilling to sell anything beyond small lots. Imports there have continued on a reduced scale. Very little Lead can be made available here, and prices are fully sustained at 59·50 francs French, Belgium and German here, and 58 Spanish at Havre. Lead remains quiet at Marseilles, despite the favorable accounts from the north. It would seem that Lead has been largely oversold in a speculative way in England, and that the sellers are now forced into the market to cover. While this is the case, affairs in Spain seem as remote from a speedy solution as at any previous time. *Spelter.*—Very little business is reported in this metal anywhere, being quiet and steady at £24 for Silesian at London, where but a limited trade has been going on, for the want of an adequate available supply. Silesian in particular is far from abundant. Here the same scarcity is observable, and we are quite firm at 62·50 francs Silesian, deliverable at Havre. Other good brands, deliverable here, 63. Marseilles remains steady. *Iron.*—The aspect of Iron matters in France is changeful and fluctuating in the extreme. This can be accounted for to a great extent by the circumstance that many of our works employ water-power, and have at times been suffering from a temporary drought, preventing the steady progress of work. It should be remarked, however, that, on the whole, our works in Central France have been getting on tolerably well throughout the present year, and have turned out dividends even better than in 1872, if we except a few at Call and the Marine Steel Works. Northern establishments have been less prosperous, having had to compete against English, Belgians and Germans, but even they have, most of them, been prospering. The Nancy region has been specially favored. *Coal.*—This fuel is quiet and heavy here. In the Pas de Calais, also, there is little doing; prices are, however, well sustained. Accounts from the Loire region are unfavorable; what is transacting there is done at gradually declining prices.

RUSSIA.

(*Journal de St. Petersburg.*)

ST. PETERSBURG, Nov. 19, 1874.—*Metals.*—The official statistics of mining industry in the Empire in 1872 are now published, according to which there were in operation, including Poland and Finland, 1055 Gold mines, three Platina, 25 Silver and Lead, 81 Copper, 1270 Iron, and 6 Spelter. The net product of these mines was the following one in puds of 36 pounds of English: Silver, 752; Lead, 74,662; Copper, in bars, 227,374; Sheet Copper, 15,723; Tin, 263; Spelter in slabs, 188,144; Sheet Zinc, 30,510; Pig Iron, 21,026,872; Bar Iron, 13,047,221; Sheet Iron, 3,234,595; Steel, 511,727,; Gold, Silver and Platina, in bullion and Specie, 18,169,031 roubles. There were turned out 19,274 pud Steel Guns and 62,376 Bronze, ditto. The number of steam engines in operation at the mines and metallurgical establishment was 589, of together 15,249 horse-power, and 38,405 water-powers of together 38,143 horse-power. The number of operatives and miners was 243,966, 70,358 of whom were employed in the gold mines alone.

BELGIUM.

(*Le Commerce.*)

BRUSSELS, NOV. 22, 1874.—*Iron.*—Business in the Iron branch has, on the whole, been quiet during the week. Our works have little in the way of orders secured for the winter time, and are living in hopes of a revival in spring. Sheet and Bar Iron seem to be in better request than most other goods, and both remain firm. Merchant Iron is still quoted at 20·50 francs, basis No. 1. Most of the blast furnaces of Luxemburg have sold ahead their Pig Iron production of 1875, hence we have little competition to fear from that quarter, nor do we expect any material fluctuations in the raw material for some time to come. Steel production is still the main topic of conversation in Iron circles in Belgium. *Coal.*—Little change has occurred in the Belgian Coal markets, in general, during the week. There is a little more activity in the Charleroi region, while at Mons, on the contrary, there is less doing, especially so far as Coal for domestic use is concerned, the weather continuing mild.

GERMANY.

(*Borsenhalle.*)

HAMBURG, NOV. 21, 1874.—*Metals.*—*Copper.*—Stocks in Germany have dwindled down considerably, and business has been restricted thereby; prices have remained firm. There is no stock left here, except a small lot of Minnesota, which may, we think, still be had at 115 marks. *Tin* has remained quiet and steady without further change in values. *Lead.*—The German markets continue well supported. Stettin is firm at 8¾ to 9 thalers for Spanish. We have had quotations fully sustained in our own midst at 23·75 to 24·10 marks German, 24·70 to 25 English, and 25 to 25·50 Spanish. The telegraphic quotation from St. Petersburg is 26½ to 27¼ roubles the 164 kilos. for Lead on the spot. *Spelter.*—Of this metal the stocks also remain but scanty, and prices remain firm. Stettin is 8 to 8¼ thalers. There have been sold 1000 quintals, spring delivery here, at 24 marks. Spot Spelter would command 24·25 to 24·50 marks today.

HOLLAND.

(*Koch & Vierboom.*)

ROTTERDAM, NOV. 24, 1874.—*Tin*—The market is quiet in anticipation of the government sale the day after to-morrow. The last price paid for Banca on the spot was 58¼ guilders, and 57¾ for delivery from the approaching sale. Billiton, to arrive, has been parted with at 56¾. The asking figure for spot Banca is now 58¾; deliverable from the November sale, 58; and Billiton, spot, 56.

CHINA.

(*Arnhold, Karberg & Co.*)

CANTON, Oct. 14, 1874.—*Metals.*—*Lead*—A slight improvement in the demand has been apparent, and stocks being very low, the tendency of prices is in favor of sellers. *Tin* is quoted 25c. per picul higher, and a fairly active demand prevails. *Quicksilver* has again risen considerably in value. The demand has been lively, and about 340 flasks found buyers at gradually hardening rates, the last sale having been effected at $205 per picul. The metal closes with a strong upward tendency, owing to news of advancing prices at home. We quote: Lead, $7·30 to $7·70 per picul; Tin, from $25 to $26·50; and Quicksilver, English, from $205 to $206; and California, from $207 to $208. *Exchange.*—6 months' sight on London, 5/9¾.

EAST INDIES.

(*Dummler & Co.*)

BATAVIA (Java), Oct. 15, 1874.—*Tin.*—Billiton, 9030 piculs were sold by auction on the 12th inst., at an average of 60·22½ guilders per picul. There is no alteration to notice in Iron. Copper Sheathing is firm. Other metals are unchanged. *Coal.*—Some 700 tons Australian, per Batavia, were sold to arrive at 27 guilders per ton, delivered on the coast, but the vessel having been lost in Torres' Strait, the sale is, of course, cancelled. It would be difficult to make this figure to-day. *Exchange.*—First-class credits have been dealt in at 11·67½ to 11·73½ guilders the pound sterling, 6 months' London.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From our Regular Correspondent.*)

SHEFFIELD, Eng., Nov. 23, 1874.

AN ENGLISH REVOLUTION.

Don't be alarmed at this heading. I am about to speak of what is, to all intents and purposes, a revolution, but it is an entirely bloodless one, and is very unlikely to lead to the loss of any lives or the serious disturbance of what has been most elegantly termed the "equilibrium of property." In short, I refer to the abolition of second-class fares and carriages by the Midland Railway Company. When I say that this proposal has been the fountain whence have flowed thousands of leading articles taking both sides of the question, and that it has excited more angry newspaper and private discussion than any other subject (always excepting the memory of our dear departed Roger), I think I put it very mildly, indeed. At any rate, the shareholders have given the directors all encouragement to proceed with the scheme by according to them an immense majority of votes at a special meeting just held. Mr. Allport, the Midland Company's shrewd general manager, is, by common report, the author of and prime mover in this matter, but there is no question whatever that he has the full support of an exceedingly able board of directors. A very large section of the public believes it will pay, and the chairman of the company avers it will, because their second-class carriages, having been mostly unoccupied, trains can be made shorter, small locomotives can run them, there will be less wear and tear on the rails, the booking arrangements will be simplified, and greater punctuality will be conduced to. These are a few of the many reasons put forward for the proposal. Against it the other railway officials urge that as a first-class carriage will only accommodate 18 people, in contradistinction to the fact that a second-class carriage will carry 30, just the same number of vehicles will have to be run—or it may be more—to say nothing of the £200 which each carriage will cost in being converted into a first-class one. Whatever the result may be has yet to be seen, but Mr. Allport is believed to have got his "idee" from the United States.

A DREADFUL COLLIERY EXPLOSION.

The Rawmarsh old colliery, not many miles from Sheffield, was, on Friday last, the scene of a very sad accident, resulting in the loss of twenty-three lives, and the injury of some four or five others. The men had gone down to their work all right about a couple of hours previously, the workings having been tested for fire damp by a "fire-trier" of 30 year's experience, and there was no reason whatever for suspecting anything would go wrong. The explosion took place soon after eight o'clock in the morning, at a point in the underground workings, about a mile or so from the bottom of the shaft by which the coal was drawn up. Fortunately for most of those in the pit at the time there were two or three other shafts available for escape, and it may be taken as an accepted fact that as many of the men as could possibly do so stood not in the order of their going, but went at once to these safety outlets. There were about 200 men and boys down at the time of the occurrence, so that, large as the loss of life was, it is little more than a tithe of those who were, in all respects, quite as likely to have been killed. One or two of the bodies were dreadfully mutilated; but for the most part the countenances of the dead men were placid, although their clothes were burned and scorched by the fierce tongue of flame passing over them.

A RAILWAY FREE FIGHT.

The abolition of second-class by the Midland Company, to which ample reference has just been made, has given great umbrage to the other great railway directors, who have met in solemn conclave and remonstrated with their more enterprising Midland competitors. But the Midland decline either to delay or to make any concessions whatever. Whereupon the other companies' directors did gather themselves together, and having girt up their loins did resolve that they would not charge higher fares than the Midland between all competing points, but they did not decide to abolish second-class, contenting their minds by reducing second-class fares below the new first-class fares of the rival they so much dread; thus is initiated a railway free fight.

CUTTING STEEL RAILS COLD.

Of all classes of men I deem the sceptical—that is to say, the utterly unbelieving, unreasoning and altogether unreasonable—men the most difficult to deal with. You may show a man of this class a large sized armor plate (an illustration confessedly savoring a good deal of this locality) and he don't think it a very big piece of iron, not so big, in fact, as ought to be produced with our modern mechanical devices. You may point to the electric telegraph, and with some little pride dwell upon the recent great extension of ocean telegraphy as an instance of the immense strides of applied scientific knowledge—but he will merely tell you that the principle is no novelty, it is just the same as stretching a wire between a couple of clothes props in a back yard, and requires but moderate seamanship to lay a cable properly. And so with everything else—*you* may grow as enthusiastic as you please, but he will remain as "darn stoopid" as Poe's Egyptian mummy, and will confute you as easily as that cataleptic bag of bones reputedly did Doctor Pormonner and Silk Buckingham. I do not suppose, for instance, that a man of this class would give any credence to these simple facts, which I have tenderly clipped from the *Engineer*, of November 21, which was headed "Cutting Steel Rails Cold:"

"The cutting of a file in halves with soft iron was an old lecture experiment. The soft iron formed a disc about 6 inches in diameter, on a lathe spindle, and run at about 2000 revolutions per minute. A file held to the edge of the disc was cut in two in about 10 or 15 seconds, the disc being unharmed. The shower of sparks rendered this a brilliant experiment, very popular with a general audience. The principle involved is now being applied to a practical purpose. Mr. Charles White, manager of Sir John Brown & Co.'s Works, Sheffield, has found the cost of cutting off the ends of steel rails cold, in the ordinary way, so enormous that he resolved to try another expedient. For experiment, he last week had an ordinary rail saw put in the lathe and all the teeth cut off. The revolving disc was then mounted on a spindle and driven at nearly 3000 revolutions per minute. The disc was three feet in diameter, so that its circumferential velocity was about 27,000 feet, or over five miles a minute, or 300 miles an hour. Steel rails forced against the edge of this disc were easily cut through in three or four minutes each. The rails weighed 65 pounds to the yard. Sparks flew in abundance, and the disc appeared to melt the rail before it; but after cutting five rails the disc itself was not sensibly warm. The experiment was such a complete success that the firm intend putting up a very powerful saw for the purpose of cutting cold steel rails."

SCOTCH PIG IRON MARKET.

The Glasgow market was pretty firm during last week, but there was no material alteration in the quotations for warrants. Neither was there any variation in makers' iron beyond about 6d. per ton reduction in Coltness No. 1. Eglinton is, if anything, a trifle firmer, and Glengarnock has no appearance of being reduced at present, unless as an item in a general drop. Writing on the 21st of November, Messrs. James Watson & Co. (Glasgow) say: Our market for Scotch pig iron has been firm during the week. Opening at 85/9, price of warrants advanced to 86/10½, closing to-day at 86/, cash, buyers. Shipments last week were 9048 tons, against 9282 tons in the corresponding week of 1873.

	No. 1.	No. 3.
G. M. B., at Glasgow	90/	81/
Gartsherrie, "	103/	84/6
Coltness, "	104/6	84/6
Summerlee, "	96/	82/6
Langloan, "	103/	84/6
Carnbroe, "	94/6	82/6
Calder, at Port Dundas	105/	83/
Glengarnock, at Ardrossan	96/6	84/6
Eglinton, "	89/	80/
Dalmellington, "	89/	81/
Shotts, at Leith	101/	84/
Kinneil, at Bo'ness	93/6	78/

Messrs. Swan Brothers' (limited) circular gives the following information:

Glasgow Brands.	Furnaces B'wing, 120	Furnaces Out 37.	Furnaces Built, 157.	Prices. No. 1.	No. 3.	No. 4
Gartsherrie	13	3	16	105/	85/	..
Coltness	12	0	12	105/	84/	..
Summerlee	6	2	8	97/6	82/	..
Langloan	7	1	8	102/6	84/	..
Govan	4	1	5	91/	81/	..
Calder	6	2	8	*105/	84/	..
Shotts Bess'mer	5	2	7	100/	95/	..
Shotts Ordinary				102/6	84/	..
Carnbroe	4	2	6	94/	82/	..
Wishaw	2	1	3	..	..	..
Monkland	6	3	9	90/	81/	..
Chapelhall				..	..	..
Clyde	6	0	6	90/	81/	..
Quarter-Clyde	4	1	5	90/	81/	..

* f. o. b. Glasgow, 1/ per ton, extra.

Stock in Connall's stores, 21,000 tons.

WEST COAST BRANDS—*f. o. b. Ardrossan.*

Glengarnock	7	2	9	96/	84/	82/
Ardeer	4	1	5			
Eglinton (Brand'd Eglint'n)	6	2	8			
Lugar (Brand'd Eglint'n)	4	0	4			
Muirkirk (Brand'd Eglint'n)	3	0	3	88/	79/6	85/
Portland (Brand'd Eglint'n)	3	3	6			
Dalmellington	6	2	8	88/	80/	75/

EAST COAST BRANDS—*f. o. b. in the Forth.*

Kinneil	3	1	4	94/	78/	72/6
Almond	2	1	3	92/6	80/	..
Carron Select'd	5	1	6	100/	..	..
Carron Ordn'y				90/	..	..
Lochgelly	2	2	4	90/	83/6	..
Lumphinnans	0	2	2	..	77/6	70/
Bridgeness	0	2	2	..	..	..

THE BLOCHAIRN IRON COMPANY.

A Northern newspaper somewhat pointedly details the principal features of this extraordinary company—another example of the manner in which "limited" companies have worked incalculable mischief:

"This unfortunate concern, which has come to so unhappy an end, was established in June, 1873, and was guaranteed to pay its shareholders 10 per cent. for five years. During the first 11 months of its existence the loss amounted to £135,000, so that, instead of a dividend being declared, in conformity with the promises of its vendors, notice was sent to the shareholders that the company had suspended, and calls were demanded on the shares taken. The original proprietors of these works were Messrs. Hannay. The properties consisting of the Blochairn Iron Works and collieries have been valued, says the prospectus, 'under our own instructions,' at £301,000, and 'stocks and working capital at about £200,000;' so to purchase and work the business it appears from this that £501,000 was required; but that there should be sufficient to pay the vendors and carry on the business, the directors propose to raise a capital of £600,000 in 12,000 (£50) shares. The flattering statements of the prospectus, and the bait of a guaranteed interest of 10 per cent. for five years, induced some 210 outsiders to take shares in the concern; but this, instead of raising the necessary capital, only brought (say) £400,000, or less than two-thirds of the advertised amount. Out of this sum the vendors received £301,000 for the properties as valued, and £12,822 additional for the interest on bills and extra capital expended between the date of valuation and transfer. Deduct these sums from £399,750, and there was only £85,928 left for working capital and stocks, instead of £200,000, the sum estimated as necessary in the prospectus. Out of this £85,928 the directors paid the vendors £63,458 for stocks on hand, leaving only £22,470 for working capital. In this condition the directors proceeded with the working of the concern, to find at the end of 10 months that they had lost fully £124,000, or more than half the working capital estimated as necessary in the prospectus. Consequently, at the end of March, 1874, the company stopped, and 'the directors were appointed the liquidators.' At this arrangement the deluded shareholders are indignant, and are surely justified in insisting on liquidation by persons entirely independent of the original directorate. At present a veil rests on the whole proceedings of the company, which must be drawn asunder, and the unfortunate facts revealed. Since the suspension two of the Messrs. Hannay have been laid in their graves—the father and the eldest son—but they had their coadjutors, who should not be permitted to escape by assuming the disguise of liquidators."

A CRUMB OF COMFORT

has fallen to the Cleveland district in the shape of an order for 6000 tons of rails, which has been sent by the South Indian Railway to Messrs. Johnson & Reay, Moor Iron Works, Stockton-on-Tees. In the present dull state of the Cleveland iron trade even a petty order like this is a little windfall.

TRADES OF SHEFFIELD.

Trade generally is quiet, and it hardly appears probable that any improvement will have to be chronicled this side of Christmas. The heavier

branches of business appear to be experiencing the most pronounced dullness, particularly the Bessemer steel department, and some of the industries which are naturally and necessarily very closely allied with it. So quiet has this branch grown of late that a statement has been made in the public papers, without calling forth any contradiction up to the time of my writing, that one of the largest Bessemer establishments in South Yorkshire was completely set down for want of orders. It is not by any means advisable to give the names of firms who are thus temporarily lacking a sufficiency of employment, otherwise it might here be recorded that there are in this vicinity several such in the Bessemer and steel rail trades. One or two works, on the other hand, appear to be doing pretty well even yet, but there is every reason for presuming that their employment is founded upon contracts entered into long since, and not upon orders of anything like recent date.

In the face of this growing quietude it is not surprising to hear rumors of impending further reductions in the wages of iron works of almost all classes—reductions which will probably be made in other districts at the same time as this. The men meet these vague rumors by talking of starting co-operative steel and iron works, but, it yet remains to be seen whether these will assume definite practical shapes. Other co operative ventures have not always proved wholly sucessfully—one or two instances in point being furnished in this vicinity.

The armor plate departments are still well employed, and have orders on hand which will assure them a continuation of prosperity for some time to come. A curious rumor on the subject of armor plates comes from a contributor to a Midland journal, signing himself "An Independent Member." He says, in effect, that the government, dissatisfied with the high prices charged by two well-known Sheffield firms for armor plates, have determined to evade the result of the monopoly, if possible, by purchasing them abroad. They have, therefore, he says, sent a commission abroad into Belgium, &c., ostensibly to inquire as to ships' plates, &c., but really to see if armor plates cannot be bought at fully £10 per ton less than what is now paid. This is a strange assertion, considering that the two "monopolizing" firms in question manufacture for all the Continental and foreign governments, and are, in fact, the only firms who have machinery of sufficient size and power for rolling, planing, &c., plates and shields of the large description.

The general cast steel trade does not improve much, although one or two of the principal houses are in receipt of more numerous and somewhat larger orders for best steel from American and home customers.

Edge and machine tools continue to be in very great request, the former for Australia and India.

The returns just issued showing the quantity of coal sent by railway from various districts to the metropolis, during the month of October, exhibit a falling off when placed in comparision with the corresponding period of 1873, but there was a marked increase over the total tonnage conveyed during the preceding month, September. In last month the Midland again headed the list with 154,963 tons, the London and Northwestern taking second honors with 84,813, the Great Northern being third with 77,256, and the Great Eastern fourth with 68,345 tons. For the ten months ending October 31st, the position was precisely the same, the figures for that period being: Midland, 1,310,181; London and Northwestern, 792,801; Great Northern, 687,131, and Great Eastern, 534,935 tons. Dealing with the month of October alone, it is seen that the Great Northern carried less by 40,000 tons than it did during October, 1873, there being a falling off in the quantity sent from the Barnsley thick coal collieries. Twelve of the principal pits working this seam, however, sent 14,400 tons as against 13,700 during September. The chief Silkstone pits also dispatched an augmented tonnage to London. There was, as well, a greater quantity sent into the Lancashire district owing to the strike of miners existing there. The Derbyshire collieries were, as usual, well to the fore, with Clay Cross in the post of honor. That colliery, or rather series of collieries, with Langley Mill, sent 50,000 tons to London during the month. The other large Derbyshire pits, Eckington, Sheepbridge, Staveley, &c., also forwarded more coal, ten of the leading collieries, in fact, forwarding 103,900 tons as against 96,900 in the month of October last year.

The coal trade is now in an active condition, so far as the house coal branch is concerned, there being considerable difficulty in obtaining the prompt filling of orders. The export business is fairly well sustained at recent rates, but there is not a great amount of activity in steam coal or coke of any kind. In cutlery there is a little more doing for several of the Eastern markets, and for India as well as British North America and New Zealand. Japan, too, is becoming a pretty good customer, but that Heathen Chinee does not appear to have any growing inclination for our goods. Spain is taking a rather large quantity of spears and pocket knives, together with those of a special class, such as pruning knives for vines and other general horticultural purposes. With the Levant, and certain parts of Africa, a medium trade is being done in what is most indubitably common cutlery, the resident ladies and gentlemen in Africa not having as yet attained any very discriminating knowledge on the question of relative proportion of parts, precision of finish or suitability of materials. If they will cut off a man's head, they have passed a very fair average, every day, business-like test.

STAFFORDSHIRE AND BIRMINGHAM HARDWARES.

There is exceedingly little change in the price of or demand for the finished iron of South Staffordshire or Birmingham. Some makers are conceding 2/6 to 5/ per ton, in order to secure orders. Common bars are £9. 10; marked bars, £10. 10/ to £11, and singles sheets, £12. 10/ to £13 per ton. As a whole, there is very little business doing apart from the local and home markets, which are rather more satisfactory than before. As to Birmingham hardwares in detail I am tempted to quote from the local *Post*, which temptation I yield to:

"Manufacturers in Birmingham and the district are well engaged, and are likely to continue so till the end of the year, till which time, also, further concessions of price are scarcely probable. Just now, in fact, the tendency is rather the other way, owing to the exceptional activity of the general metal market, and especially the recent upward movement in copper. As a result of the last advance copper kettles, rivets, wire, cut tacks and boat nail washers are ¼d. per lb. dearer, and rolled brass and brass wire ½d. per lb. Brass and copper screws and brass door knobs have also been advanced by a revision of discount. Ironmongery goods are without change, the easier price of common iron being counteracted, so far as regards the cost of production, by the general scarcity and dearness of labor. This is especially the case in the wrought nail trade, in which orders are now greatly in arrear, and several descriptions of nails scarcely to be had at any price. In this branch it will be seen, by a statement below, the workpeople are again agitating for an advance, under threat of a strike. The iron wire trade continues dull, under the cramping influence of foreign competition; but Belgian importations of wire here appear to be checked for the present by the use of Belgian and Prussian instead of English iron for wire drawing purposes. English wire drawers, however, are unable to compete with Belgian makers in foreign markets, and home production is virtually restricted to the requirements for home consumption. Iron wood screw and rivet makers are among the best customers for English-drawn wire at present, the screw mills being all in full operation, and the manufacture constantly extending. Cut nail and iron hinge manufacturers are for the most part well employed, and the demand for tacks is large and pressing. There is a little more activity than lately reported in the iron tube branch, but it is chiefly apparent in the demand for common goods for gas-fitting purposes. Chandelier makers are all very busy, and the orders for railway and carriage lamps are satisfactory. In the electro-plate branch, makers, as a rule, are well engaged, both for home and export. With reference to the price of nickel, we are informed by local refiners that there is little prospect of reduction for a considerble time to come, as the nickel requirements of the German government alone for coinage purposes will tax the powers of producers, both in this country and Germany, to the utmost for nearly twelve months ahead. Ammunition makers are very busy still on German and Spanish percussion cap and cartridge contracts, and their weekly consumption of metal is now something enormous, a fact which, taken in conjunction with the general activity of the local brass-foundry trades, will go far to explain the remarkable buoyancy of the copper market. In the jewelry branch the makers of best goods complain of quietude, but for common or second-class jewelry there is a steady demand, running chiefly upon studs, pins, brooches, gem-rings, and gold chains. Lock and safe makers experience no dearth of orders. Best mortise locks, in particular, are in rather active demand. Zinc workers and galvanizers are well employed upon chimneys and cowls, perforated sheets, ventilating apparatus, roofing. Galvanized bowls and kitchen utensils are also in good request. Excepting in the department of spades and Brazil hoes, local edge-tool makers continue busy.

THE SOUTH WALES DISTRICT.

The news from this district is still of an unusually unsatisfactory nature, there being very little work either in iron or steel, and so few orders that it does not appear unlikely that work may have to be stopped altogether almost immediately. The ironworkers of the locality have accepted the 10 per cent. reduction as a body, simply because they felt that there was no possibility of making a successful resistance. This, altogether, is a total reduction of 35 per cent. in wages since the highest point of activity was reached a year and a half since. Still there is a rumor of a further drop of 10 per cent., which the masters are understood to look upon as being an absolute necessity, and an indispensable preliminary to the acquisition of remunerative orders. There can be no doubt whatever that, with present quotations, iron making in South Wales is being done at a positive and clear loss of several shillings per ton.

THE METAL MARKETS.

Metals have been tolerably strong, all round, as to business done, but in copper prices finished just a shade easier on the week. Messrs. French & Smith say: "In copper there has been a steady market for consumption, and prices closes firm at same as last week. The demand for tin is good, but in the absence of speculation there is a decline in Straits and Australian of about £1 per ton during the week. Lead is scarce and firm. In other metals there is nothing new to notice."

As to copper, the *Mining Journal* thus discourses: "There never was a more legitimate rise in the value of copper than the present one, and the best guarantee of this may be found in the continuance of the very large deliveries and the reduction of stocks. Nothing could be more conclusive than the statistics, and no stronger evidence could be produced of the genuineness of the demand. Whatever may be said to the contrary is false, and we do not hesitate to pronounce the advance perfectly justifiable, advisable and reasonable. The position of the market is, in all respects, calculated to impart the greatest amount of confidence to buyers, notwithstanding the unwarrantable insinuations made by a Liverpool correspondent in the city article of Monday's *Times*, and for which we believe there is not the least foundation. The whole tone and tenor of his vague accusations about speculators taking copper from stock and secreting it in unknown places, for we cannot interpret his meaning otherwise, so completely reveals the chagrin of 'Bruin' discomfited and suffering from a terrible sore head, that it has been an immense source of fun and merriment to all who have read the cunning attack. It is not an uncommon trick for 'Bears' to show their big teeth and long claws when they have over sold themselves. They wish naturally enough to unsettle and depress the market for their own personal benefit, but the ugly monsters do not always succeed, and, in this instance, 'Bruin' might as well try to stop an express engine as to attempt to retard the onward course of our market. But we would advise 'Bruin' that to be influential he must, at least, be truthful, and what he previously remarked about the price of ores was clearly contradicted in the journal of last week, and we shall now contradict all that he has said since. If there is anything to be exposed it had better be done at once in a plain, candid, unmistakable manner, and not by artful, mysterious reflections, which no body can well understand the meaning of. We invite publicity, and are entitled to an explanation, or, let him apologize, and drop the subject altogether. He has laid a stigma upon the whole trade in a foul and unscrupulous manner, and we cannot wonder at the just indignation which it has provoked on all sides.

"A great stress has been laid upon the price of ores, but there is really nothing in it, even supposing they had risen disproportionately, which has already been shown is not the case; the market now is not governed, and very slightly influenced, by the price given, neither do the smelters pretend to exercise any special control over the market. The price of ores has gradually improved with other sorts of copper, and all descriptions have fairly participated, and none to any extent disproportionate, although, as a rule, the raw material would naturally advance quicker than manufactured.

"So much has been made of the sale of 7000 and odd tons of pure copper in ores and regulus being a most exceptional aggregate for ten weeks' consumption, but considering this is distributed amongst all the smelters, it is by no means an excessive quantity; but even supposing it to be so, which it is not, then it only proves how large are the requirements of smelters, and what great confidence they possess in the stability of prices. And this is further confirmed to-day by their buying about 1700 tons more regulus at 18/. Credit must be given to the smelters for knowing the value of the article they are dealing in, and is it likely they would purchase 7000 to 8000 tons of copper without seeing the prospect of making a fair profit by the business? The ores and regulus could not have passed into safer, stronger and better hands. And we congratulate them on so good a purchase. It is estimated that not one-half of the purchases of smelters ever enters into the market as raw copper again, it is mostly manufactured into sheets and yellow metal. Smelters are probably better supplied with furnace material than they were the greater part of the year; at one time they quoted low prices for refined metal, yet no great quantity could be bought, and as a matter of course a large quantity of refined foreign had to be exported. But the *Times* says that 'the smelters are mostly holding aloof from the market;' however they can reconcile this remark with the statement that the 7000 tons and odd of fine copper in ore have gone into smelters' hands we must confess is perfectly unintelligible. But when they say that it may be 'fictitiously bought up,' why then, perhaps, it is not very surprising that it does exceed our comprehension, because the *leading* smelters have always acted so openly, so very straightforward and honorably, that transactions of that nature never occured to us.

"Chili copper exported from England mostly goes to Havre, where an accurate account is kept of the stock, which can be relied upon quite as much as the returns made up by the wharfingers in this country.

"*Lead.*—Business has been done in English pig lead, good soft quality, at £23. 15/; Spanish without silver is quoted £23, and with silver 5/ under. *Spelter.*—Very little business is reported in this metal. Silesian on the spot has changed hands at £24. English hard spelter is quoted £16. *Tin.*—The market has been quiet throughout the week, with hardly any variation in price, and Straits has realized £93. 10/ to £94. *Tin Plates.*—The tin plate market is firm, but there has been no variation."

Messrs. Von Dadelszen & North's report: "*Copper.*—Since the appearance of the *Times'* comment on the present position of copper, we have to report a quieter market, and in some instances a small reduction in price has been accepted. The statistics published on the 14th showed a further reduction of 1700 tons Chili produce in the available stocks. Picked brands have realized as high as £92; named brands, £89, and g. o. b., £88. 10/; but we must quote prices all round 10/ less now. Wallaroo has realized £97, cash, and £98, three months; Burra, £95 to £95. 10/. English remains firm at last week's quotations, with a good demand. *Tin* is also quieter, and lower prices have been accepted for Straits, while Australian remains scarce and firm. Business to a small extent has been done in Straits, from £94 to £93, closing at the latter; Australian, £93. 10/, cash. Several parcels of Straits afloat have changed hands, from £93. 10/ to £93. English tin firm. Banca and Billiton quite nominal. Tin plates in good average demand at steady prices. *Lead* remains firm, and is about 5/ dearer, good ordinary soft pig lead having been sold at £23. 15/. *Spelter.*—Although the market is very firm, we hear of no official business here, and prices remain quite nominal, at about £24. Quicksilver, £25, to arrive."

Messrs. Warner Walduck & Co.'s prices current: "Railway chairs and bowl sleepers, £4. 15/; castings, £5. 15/, at works; "champion" bars, £10. 10/; hoops, £11; sheets, £13; strip, £10; charcoal bars £21; hoops, £22; sheets, £24 per ton, at works; solid drawn steel tubes, from 1/ per foot; bolts and nuts from £17. 10/; spikes and rivets from £12. 15/, in London. *Tin Plates.*—"Hendy" charcoal, extra fine quality, 38/ per box; "Gower" charcoal, 35/; "Rhos" coke, 31/6 per box; common coke plates from 26/ per box in London. Rolled brass, 9½d. per lb.; brass tubes, 12½d. per lb.; copper tubes, 12¼d.; brass wire, 10d. per lb.; copper wire, 12¾d. per lb.; yellow metal, 9¾d. per lb.; copper sheets, 110/ per cwt.; spelter solder, 9d. per lb.; telegraph wire, 13d. per lb."

The following is the latest Liverpool metal and iron report: "*Copper*, after advancing to £89 for Chili bars, is easier to buy. *Tin* steady. *Tin Plates.*—Not much inquiry.

LATEST LIVERPOOL PRICES.

Iron; f. o. b. in Liverpool, per ton.

	£	s.	d.	£	s.	d.
Merchant bar	9	5	0 to	9	10	0
Merchant bar, in Wales	8	15	0 to	9	0	0
Staffordshire	9	15	0 to	12	0	0
Hoop	11	10	0 to	12	10	0
Sheet	13	0	0 to	14	0	0
Nail rod	10	5	0 to	10	15	0
Bar, best crown	9	15	0 to	10	5	0
Boiler plates	12	0	0 to	13	5	0

Tin Plates; f. o. b. in Liverpool, per box.

	£	s.	d.	£	s.	d.
Charcoal, I. C.	1	15	0 to	1	18	0
Coke, I. C.	1	7	6 to	1	10	0

Copper; Delivered in Liverpool, per ton.

Bolt and Sheathing	£100
Tile	93
Tough cake	93
Best selected	95

Tin and Its Application in Domestic Economy.

BY DR. LEWIS FEUCHTWANGER.

(Concluded.)

Tin Plate or Sheet Tin.—It forms one of the most important branches of England's domestic industry, supplying the world with this indispensable material; for millions of boxes, containing 112 lbs. each, are exported annually from there, and a million of boxes are imported into the United States. The tin plate consists of sheet iron, alloyed and coated externally with pure tin. Sheet iron of the best quality is cut into sizes required, bent into triangular form, heated to redness in a reverberatory furnace, dipped into hydrochloric acid, drained and again heated to scale the whole surface. This forms the most important operation, for any trace of oxide would prevent the adhesion of the tin. They are then beaten level and smooth, passed cold through chilled rollers, immersed in lye, a weak bath of fermenting bran water, pickled by agitation for some time in a bath of diluted sulphuric acid, scoured in water with sand and hemp, and kept for use in pure water. The clean plates, dried by bran, are kept in a bath of melted tallow, called a grease-pot, for an hour, and then passed through a series of rectangular pots. The first is the tin pot, contains the melted block tin, covered by grease, into which the plates are dipped one by one, and kept there one and a half hours; then they are put on an iron grating to drain, and dipped into a wash-pot containing the fused tin. In this the superfluous tin is removed from the surface. The plate is then lifted out, scoured on both sides with a hempen brush, dipped for a moment into the melted tin in a compartment of the wash-pot to remove the marks of the brush and give uniform smoothness to the surface, and then immersed in the adjoining grease pot, where some superfluous tin is removed and collects on the lower edge. The plate is next put into the empty pot to drain. When cool enough, the lower edge of the plate is dipped into the hot pot containing one-fourth inch depth of melted tin, by which the accumulation of tin on the edge is melted off, leaving a dull edge, which may be seen on all the sheets. The plate is then cleaned with bran and packed. About eight pounds of tin are required to cover 225 plates, which weigh 112 pounds. Terne plate is sheet iron coated with an alloy of tin and lead.

Tin being unaltered by exposure to air at the ordinary temperature, will effectually protect the iron from rust as long as the coating of tin is perfect; but as soon as a portion of the tin is removed, so as to leave the iron exposed, corrosion will take place very rapidly, because the two metals form a galvanic chain, which decomposes the water (charged with carbonic acid) deposited upon them from the air, and the iron having the greater attraction for oxygen, will be the metal attacked. In the case of galvanized iron (that coated with zinc), the latter would be the metal attacked, and hence the greater durability of this material. Next to sheet tin, another very useful substance in everbody's possession are the common pins, which consist of a brass wire coated with tin by boiling them with cream tartar, common salt, alum, granulated tin and water. The tin is oxidized at the expense of the water, and is then dissolved by the acid liquid, from which solution it is reduced by electrolytic action, for the tin is more highly electro-positive than the brass, and the latter acts as the negative plate. The alloys of tin are not very numerous, but very indispensable and useful. The solder is an alloy of tin and lead, in various proportions. The fine solder is composed of two parts of tin to one part of lead, and the common solder of equal weights of both metals; these alloys melt at a lower temperature than tin; it is, however, necessary that before soldering that the surfaces to be united be quite free from oxide, wherefore it is well to use either the sal-ammonia, hydrochloric acid, or even borax, which is remarkable for its ready fusibility, and its solvent power for the metallic oxides. Next in importance are the pewter and Britannia metal. The first is a compound of four parts of tin and one lead, and the latter a little addition to the last ingredients of small quantities antimony, copper and lead, or it may be made of 12 parts of tin, one antimony and a little copper.

Gun Metal is an alloy of 90 parts copper and 10 parts tin, which is known to possess great tenacity, hardness and fusibility. In preparing this alloy it is usual to melt the two first with its weight of copper, whereby a hard, white and brittle alloy is obtained; the remainder of the copper is fused in a deoxidizing flame of a reverberatory furnace; the hard metal is then mixed with it, long wooden stirrers being used, and a quantity of old gun metal is usually melted with the copper.

Bronze is especially an alloy of copper and tin, containing, however, more tin than gun metal; very often small quantities of zinc and lead are added to it. Bronze is affected by changes of temperature in a manner precisely the reverse of that in which steel is influenced; for it becomes hard and brittle when allowed to cool slowly, but soft and malleable when quickly cooled. We often see ancient weapons of bronze, long before iron was introduced as weapons.

Bell Metal is an alloy of about 4 parts copper and 1 tin. Lead and zinc are sometimes added to it. The same composition is used for musical instruments.

Speculum Metal, used for reflectors in optical instruments, consists of 2 parts copper and 1 tin, and in order to render it susceptible of a higher polish, some silver and zinc are added.

Type Metal is composed of tin 1 part, antimony 1 part and lead 2.

The Bronze Powder, or Mosaic gold, which is so much employed in the arts for ornamental and decorative purposes, is, properly speaking, a bi-sulphide of tin, or stannic sulphide. The process of preparing it is rather complicated, and the same as has been prepared in 1771, and in the following manner: The metallic tin, say, 10 lbs., is mixed with 5 lbs. quicksilver; the amalgam obtained is mixed with 4 lbs. powdered sulphur and 3 lbs. sal-ammonia. The whole is heated in a sand bath so long as the sulphureted hydrogen is disengaged, and then the temperature of the mixture is raised to a dull, red heat until all fumes disappear. At the bottom of the vessel it is deposited as beautiful yellow scales, which is powdered, levigated and dried. Many shades of bright gold, yellow and green-yellow are prepared from copper precipitated from the solution by iron. A simple and modern method of preparing the bronze powder is to precipitate the solution of tin into sulphureted hydrogen, and the yellow bronze is obtained.

The *Tin-Tree*, a chemical toy which produces the metallic tin in its purest state, is obtained in crystals by the feeble galvanic current, excited by immersing a plate of tin in a strong solution of protochloride of tin, what is called the stannous chloride, covered with a layer of water, so that the metal may be in contact with both layers of liquid; and if to imitate the tin-tree of a natural form, granulated or feathered tin is to be dissolved, in strong hydrochloric acid, and the liquid to be diluted with four times as much water, and on suspending a cylinder of cast zinc in the solution, the tin clusters around it in a crystalline form.

The *Putty-powder*, for polishing marble, gems and granite statues, and clearing sheet glass, is known as metastannic acid, and is obtained in two methods. The one is the hydro-chemical method, prepared by treating the metallic tin with nitric acid, which does not dissolve it, but converts it into a white powder. And the other is obtained by exposing the tin in a reverberatory furnace for six or eight hours to a cherry-red heat under constant agitation. When disintegrated to a powder it is removed from the furnace, finely powdered and sifted through a fine wire sieve, No. 100, and then it is put up in boxes of 12½ and 25 lbs. If pure, and not adulterated with lead, it is grayish white, and of lively color. The two oxides of tin and their salts are of great importance in domestic economy, as their combinations are so much used in the arts. The stannate of soda, which is so extensively used as a mordant by calico printers, is prepared on a very extensive scale in England from the ore, which, as has already been stated, is a binoxide. It is heated with a solution of caustic soda, and boiled down till the temperature rises to 500 deg. Fahr., or the tin ore is fused with nitrate of soda, whereby the nitric acid is expelled; it crystallizes easily in hexagonal tables, which dissolve in cold water. There exists two chlorides of tin, corresponding to the two oxides—the proto-chloride or stannous chloride is obtained by dissolving tin in hydrochloric acid, with the addition of a little nitric acid with the aid of heat, which, on cooling, deposits crystals in prismatic needles, known in commerce as crystals or salts of tin. By redissolving the crystals, and adding water to them, an oxychloride is separted as a white powder, which is very extensively employed by the glass, porcelain and enamel manufacturers for producing a milky-white composition. The bi-chloride of tin, called also stannic chloride, is obtained now in considerable quantities. In the operation of detaching the tin from the sheet tin by the process of heating it in a current of dry chlorine, when the action begins the perchloride distils over as a heavy, colorless liquid of 2·28 specific gravity, which is very pungent and fuming, and is volatile at 240° F., giving out suffocating fumes. *Pink salt*, an old dye for scarlet, is prepared from the perchloride of tin and sal-ammonia.

The Storage of Water.

We make the following extracts from an interesting and valuable paper by Mr. J. B. Denton, an English civil engineer, on the storage of water:

THE QUANTITY OF WATER REQUIRED FOR ALL PURPOSES.

The quantity of water actually consumed at present varies from as little as two gallons per head per diem in villages and isolated places where the water used is obtained by personal labor, to from 30 to 50 gallons per head per diem in some of our cities and towns where public supplies and considerable waste exist. The average quantity used throughout England and Wales for *all* purposes is probably not much more than 15 gallons per head, though it may be well to allow that before the next 20 years have passed the increasing demand for water for all purposes will raise this quantity to a mean of 25 gallons. Now, if the population of England and Wales, which reaches 25,000,000, is multiplied by 25, it will amount to 625,000,000 of gallons per diem, or 228,125,000,000 per annum. To this requirement of the population we must add the water which is wanted by animals and farm stock scattered throughout the country, and which are not provided for in the water supply of towns. The number of horses, cattle, sheep, pigs and dogs does not much, if at all, exceed 50,000,000, and if we consider that on an average each animal uses and wastes five gallons per diem, the total result will be 250 millions of gallons per diem, or considerably less than half the quantity required by the population. This quantity has to be supplemented by the water consumed in the production of steam used in manufacture, as well as that which is used at the homestead or in the field, and which I hope will be greatly increased. This, however, even if we allow that steam-power to the extent of from 10,000 to 12,000 horse-power per annum is added to the power used in agriculture alone, cannot bring the whole to more than 1000 millions of gallons per diem, or 365,000 millions per annum, which is only a 74th part of the total rainfall with which Providence blesses us on the average of years. In fact, if it were in the power of man to secure the whole of the water required for all uses before the rain was absorbed by the ground, the quantity would be comparatively so small that it could not possibly injuriously interfere with any of those functions which the rain performs, nor in any way affect our general water economy. To make this more clear, it may be stated that if there were allotted to each unit of the population 25 gallons of water daily for all purposes, public and private, it would require 9125 gallons for the year's supply, while one inch of rain falling on an acre of surface, being equal to 22,622 gallons, would afford a year's supply to nearly two and a half persons.

STORAGE TO BE ADOPTED FOR VILLAGES AND RURAL DISTRICTS.

Though the storage of water must commend itself to most people as an object of great importance, the subject would hardly be appropriate if it were limited to generalisms, and were I not to show how it may be usefully applied in rural districts for the village and the farm. The storage of water in small quantities is necessarily an expensive proceeding, for open shallow ponds and reservoirs, encouraging, as they do, the growth and decay of vegetable matters, are to be avoided, if possible, and either deep open reservoirs, or covered tanks should be resorted to. The use of concrete as material for the construction of underground tanks, however, reduces the cost very considerably, and will, I hope, help greatly their introduction in rural places. The commonest lime, properly slaked and mixed in due proportions with clean gravel and sand, or with burnt clay ballast, or even sifted chalk itself, if faced with Portland cement, will make admirable tanks. Scientific cement will probably be found on trial to be equally applicable as a water-tight facing, using perhaps twice as much more than Portland cement, which can be done without increase of cost, for it is to be bought at half the price. In using common lime—*i. e.*, the lime of the locality—for the main body of concrete, great pains must be taken to have it thoroughly slaked before mixture, for if this is not done, the lime will afterward slake in the wall and cause fracture, and fracture means leakage. No dwelling or set of buildings, of which the roofs are slate or tile, should be without its tank, unless the occupants are otherwise abun-

dantly supplied. There are few places in England, and certainly none in Wales, in which 20 inches of rain may not be collected with certainty, even in the driest year. Taking an ordinary middle class house in a village, with stabling and outbuildings, the space of ground covered by the roofs will frequently reach 10 poles; while the space covered by a farm laborer's cottage and outbuilding will be 2½ poles. Assuming that the roof is slate, and the water dripping from it is properly caught by eave-troughing and conducted by down pipes and impervious drain pipes into a water-tight tank, sufficiently capacious to prevent overflow under any circumstances, and that by this method 20 inches of water from rain and dew are collected in the course of the year, the private houses will have the command of 28,280 gallons, and the cottage 7070 gallons in a year. To make it clear that this quantity of water can generally be obtained, it should be stated that the proportion lost by evaporation, etc., from a slate covering will not exceed one-sixth of the total quantity of rainfall with the deposition of dew added. A tank 16 feet long and 10 feet wide will hold 1000 gallons in every foot of depth, and where the water is not wanted for drinking it need not be covered except with a common boarded floating roof of half-inch boards fastened together. This floating roof keeps the water clean, and reduces loss by evaporation. The supply of water to villages, however, should not be dependent upon individual action altogether, for the occupiers themselves are powerless, and cottage owners as a rule are not very liberally disposed in the provision of this necessary of life. There should be some public supply, to render villagers independent of their landlords. Where there exist rivers or streams of pure water near at hand, or where there is a subterranean water bed easily reached by sinking wells down to it, it is needless to think of storage, but so long as there are large numbers of small communities with rating values so low as to negative the power to charge any large outlay upon them, it behooves us to consider with the utmost care any plan which will enable us to secure a sufficient supply of pure water at a cheap cost. In villages it is unnecessary to aim at the supply of from 20 to 25 gallons a head. Two gallons of water per head per diem is as much as is at present consumed in the majority of villages, and 10 gallons are quite ample. To supply 10 gallons a head should not be a difficult matter; though in cases where there is no land that has been artificially underdrained near at hand allowing of the under drainage water being utilized, or where there is no other means of collecting surface water, it may be absolutely necessary to combine several villages, and by a properly devised system provide for the whole.

FIELD STORAGE.

I have pointed out on more than one occasion how on clay land farms, where thorough drainage has been adopted or is required, the water of under drainage may be preserved, sometimes in ponds, but more frequently in underground tanks, for the use of the cattle of the farm and for steam cultivation. The facilities with which such provision can be made have not been sufficiently acknowledged. A 10 horse-power engine requires for the cultivation of an acre of land from 100 to 125 gallons of water, and an underground tank capable of holding 2500 gallons would, therefore, be sufficient for the cultivation of 20 acres. For this quantity the tank should be 8 feet wide, 10 feet long, and 5 feet below the level of the drains, and if concrete were used the cost need not exceed £15 or £16. This tank might be placed in any position convenient for the steam plow or cultivator, and none will deny the great value of such a supply of water wherever steam is employed in the cultivation of land situated on hills where water is now difficult to get.

A Visit to Woolwich Arsenal.

We take the following from the London *Daily Telegraph*: Great guns and heavy missiles, rifled ordnance and chilled shells—such are the objects to which principal attention is just now being directed by the most civilized amongst nations. There is no exception, not an empire, kingdom, or republic exists that is not endeavoring to outvie all competitors in the discovery and manufacture of implements of destruction. Certainly the mode is at present but bungling and incomplete; the machines of death are far behind the requirements of this unsettled, grasping, fighting age; and improvements numerous and stupendous—far beyond all imagination—may surely be reckoned upon. But for all that, energy never tires, invention never flags, in this great race for perfection in the means of killing and slaying. As yet, however, we are mainly confined to three means of attack—the firing tube or gun, now mounted upon a huge carriage and styled a cannon, and now placed horizontally upon a wooden stock and dubbed a rifle; the missile which when solid is termed a shot, and when hollowed and filled with explosive material—gunpowder or guncotton—is called a shell; and lastly, to torpedoes, for insidious attack below the water—a means of assault to withstand which requires more ingenuity than has yet been displayed. Electricity aids, it is true, in the discharge of these last named instruments, and thus plays an important part in warfare, but what position will eventually be assigned to it—whether it will ever be made a direct vehicle of destruction, and by its immeasurable force sweep armies from the field, and ships from the ocean—time alone will show. For the present, a visit to Woolwich Arsenal is sufficient to acquaint the inquirer with all that can be done toward rendering the battle-field a scene of increasing carnage.

Perhaps it would be well to enter the gun factory first of all. Perchance a coil for the breech piece of the Fraser gun is being wound round the cylinder which gives it form and size. Slowly issuing like a huge fiery serpent from the furnace which lately held it, the great mass of metal is drawn out by machinery which lifts thirty or forty tons without sign of difficulty. The few spectators who are privileged to witness the spectacle gradually take up more distant positions than those they at first assumed, for as the mass of glowing metal comes forth and entwines itself in a coil, the heat it gives out is terrific, and, save only to the accustomed smiths whose life is spent in such temperatures, would be overpowering. They can beat it into its place with the swinging ram which hangs handily close by, and which enables them to regulate any little flaw which might possibly discover itself; to them the work is the merest child's play. The metal will be disposed of with as much ease as though it weighed only a pound, and another coil will rapidly take its place and be treated in like manner. So the spectators look on and wonder, but not with so much cause, perhaps, as when presently they pass to the building where stands the huge forty-ton hammer, and witness the work of this triumph of mechanical skill. The trunnion and breech-piece of a thirty-eight ton gun are to be welded together, and as yet lie *perdu* in the furnace hard by the hammer, and immediately under a great traveling crane. Colonel Campbell, Major Baker, and the other able officers of the department are all here; there are groups of ladies, civilians, and military men, all assembled on the platform which was once constructed for his Majesty the Emperor of Russia, and whence a good view of all that takes place can be witnessed. Through the chinks of the furnace can be seen evidences of the presence of a vast mass of molten metal, glaringly white, simmering in its intense heat till it is wanted. Some eight or ten men have taken their places in a space close to the furnace, and quietly await the order to withdraw the huge thing from its resting place. In weight it is about twenty-eight tons; for thirty hours it has been in flames of prodigious strength, slowly absorbing heat, and gradually softening. Such a weapon never glittered in the forge of Vulcan; ancient poets, could they have imagined, dared not to have described it; and yet eight men prepare to hoist it into the air with a pair of tongs, just as though it were the merest trifle, place it under the hammer, and then weld it tightly, in manner similar in every way to that they would employ when they were welding a horse shoe or making a nail. Nor have they proposed an impossibility, for suddenly the furnace door is opened, the tongs are run in, and the eight, with the aid of a steam engine, which cannot be seen, but which is acting for all that, lift up the burning mass and place it quickly on the forge. It is so brilliant that it can scarcely be looked upon; its radiance is so terrible, its appearance so awe inspiring, that until the hammer comes down with a heavy thud, and the sparks fly in a shower scintillating particles all around, it is difficult to believe that the metal is really to be dealt with in so easy and simple a manner. Blow follows blow, however, as trunnion and breech are irrevocably fixed together, a piece of cold iron is driven through the center, the twenty-eight tons are turned hither and thither, now thrown down and raised up on adverse end, then thumped and patted again, till at length a voice proclaims that it is finished, and, without more ado, the forging is lifted away and left to cool.

From the gun factory to the laboratory is but a step, and here Colonel Millward, the indefatigable superintendent of the department, is courteously ready to explain the system upon which the missiles for the guns which are being constructed are made. There is no secret in the matter. Shells such as those turned out of this laboratory cannot be produced by any other makers in the world. Long lines of broken missiles, split for the purposes of investigation, alone testify to the uniformity and goodness of the material used, the extent of the "chilling" or hardening process, and the exact strength of the fibre obtained. German shots and shells differ in a hundred ways; Russian, and even Swedish, are no better; but in the long line of missiles here, indeed, in the hundreds of thousands turned out, there is not one of a wrong weight or of inferior quality. The exact degree of hardness required for a shell which is needed to penetrate armor plating, but which must not be so brittle as to split into a score of pieces until it has effected its entry into the battery it has to assail, has been determined, and it now remains simply to keep to the recognized standard. That this is not readily done is easily seen from the specimens of foreign work which are exhibited, the superiority of English labor being apparent immediately. With the torpedoes skill of quite another kind is required; but here again our countrymen are well to the fore. Harvey torpedoes may or may not act with certainty, for it is just possible that a vessel towing one of these formidable implements may not be able to catch her opponent, or the enemy may see the buoy which floats the torpedo and evade it; but with the fish torpedo the case is very different. Here, while other nations have signally failed, Colonel Millward has succeeded beyond doubt. German artificers can manufacture the weapon, with its ponderous case for gun cotton and its fish-like tail; but they cannot discover how to float it against the enemy. Their machinery is apparently perfect; the torpedo would be most destructive if only it could be sent against the sides of an enemy's vessel, but at this precise point they fail. They cannot launch the unwieldy thing; or, if they actually get it into water, it either floats inanely and harmlessly on the surface, or incontinently sinks to the bottom. As a contrast to this, is the fact that our engineers can discharge their fish torpedo at a distance of six or seven hundred yards with unerring aim, in the certainty that presently a loud report and a jet of water will indicate that it has done its deadly work. Of course, so desirable a result has not been obtained without continued application and thought, the discarding of all old-fashioned prejudices, and the determination to discover the way to achieve success. All that is now wanted is a means of safely launching these formidable instruments from the sides instead of the bows of vessels, and that this will be speedily found there is no reason to doubt.

London Metal Market.

(From The Mining Journal.)

	£.	s.	d.	£.	s.	d.
Copper—₱ ton.						
Best Selected	98	0	0	100	0	0
Tough Cake & Tile	96	0	0	98	0	0
Sheathing and Sheets	1 0	0	0	103	0	0
Bolts	103	0	0	105	0	0
Bottoms	103	0	0	104	0	0
Old	87	0	0	90	0	0
Australian	95	10	0	97	0	0
Wire	₱ lb. 0	1	1		—	
Tubes	" 0	1	2	0	1	3
Brass—₱ lb.						
Sheets	0	0	9½	0	0	10
Wire	0	0	9¼	0	0	10
Tubes	0	0	11	0	0	12½
Yellow Metal Sheathing	0	0	8¾	0	0	9
Sheets	0	0	8¾	0	0	8¾
Spelter—₱ ton.						
Foreign on the spot	24	15	0	25	0	0
" to arrive	24	15	0	25	0	0
Zinc—₱ ton.						
In Sheets	30	0	0	31	0	0
Quicksilver—₱ bottle	21	0	0			
Tin—₱ ton.						
English Blocks	100	0	0	101	0	0
Ditto Bars (in bris.)	1 01	0	0	102	0	0
Ditto Refined	102	0	0		—	
Banca	100	0	0	102	0	0
Straits	92	10	0	93	10	0
Australian	92	0	0	92	10	0
* **Tin Plates**—† ₱ box.						
IC Charcoal	1 qual.	1	16	0		—
IX "	1 qual.	3	0	0		—
IC "	2 qual.	1	15	0		—
IX "	2 qual.	2	1	0		—
IC Coke		1	6	6	1	9	0
IX "		1	12	6	1	15	0
Canada Plates	₱ ton.	19	0	0		—	
"	at works	18	19	0		—	
Iron—₱ ton.						
Bars Welsh, in London		9	5	0			0
" to arrive		9	0	0			
Nail Rods		9	15	0			0
Nail Rods, Staff'd in L'ndon		10	5	0	11	0	0
Bars		11	0	0	12	0	0
Hoops		12	0	0			
Bars at Works		10	0	0	11	0	0
Hoops ditto		11	0	0	12	0	0
Sheets, angle, and plates		12	15	0	14	0	0
Pig, No. 1, in Wales		5	0	0	6	10	0
Refined metal ditto		7	0	0	8	0	0
Bars, common ditto		8	0	0	8	5	0
Do, merchant, Tyne or Tees		8	10	0		—	
Ditto, Railway, in Wales		7	0	0	7	5	0
Ditto, Swedish, in London		16	0	0	17	0	0
To arrive		17	5	0			0
Pig, No. 1, in Clyde		4	7	0	5	12	6
Ditto, f.o.b., Tyne or Tees		4	0	0	4	5	0
Ditto, Nos. 3, 4, f.o.b.		3	10	0	4		0
Railway Chairs		5	0	0	5	5	0
" Spikes		12	10	0	14	0	0
Indian Ch'coal Pigs in L'don		8	0	0	10	0	0
Steel—₱ ton.							
Swedish, in kegs (rolled)			—			—	
Ditto (hammered)		19		0	20	0	
Ditto, in faggots		10	10	0		—	
English, spring		19	0	0	24	0	0
Lead—₱ ton							
English Pig, common		23	13	0		—	
Ditto, LB		23	15	0			
Ditto, WB		23	15	0			
Ditto, Sheet		24	15	0			
Ditto, Red Lead		25	0	0			
Ditto, White		30	0	0	32	0	0
Ditto, Patent Shot		35	10	0	36	15	
Spanish		28	0	0	28	0	0

* At the works, 1s. to 1s. 6d. per ton less. Terne plates 2s. per box below tin plates of similar brands.
† Add 6s. for each X.

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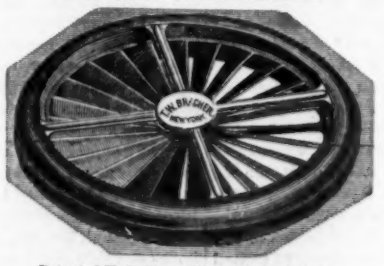
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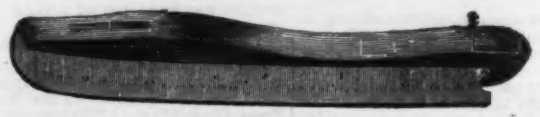
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Pawls and Lignumvitæ Head, Rosedale, Wrought Iron Nut & Socket, with **Rachet Wheel,** all respects the **IN MARKET.** slight back and forth motion than the same style of brace into general use. For Sale by all Hardware Dealers.

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No. 78 Beekman St.,
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This is the most powerful Cutter in use, and just what is needed by all retail iron dealers. Also by shipbuilders, manufacturers, and all others having iron to cut. It will cut iron twice as large as any other machine of the same cost.

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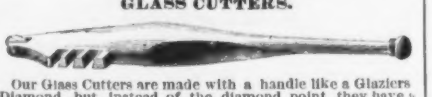
No. 2, 165 lbs.,	⅝x3 in., or ¾ in. " "	50
No. 3, 314 lbs.,	9-3x4 in., or 1-1 in. " "	75

GLASS CUTTERS.



Our Glass Cutters are made with a handle like a Glaziers Diamond, but, instead of the diamond point, they have a small hardened steel revolving wheel, the sharp edge of which cuts nearly as well as a diamond. They are durable, and will give entire satisfaction.

WITH THIS BRACKET SAW

An infinite number of useful and ornamental articles can be made. It will pay for itself every day when in use. The frame is 5x12 in., and made of red cherry wood, beautifully polished.

For sale at all Hardware stores.

Millers Falls Co.,
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In addition to the 30 Cast Steel Tools inclosed in this handle, it will hold anything from an 8 inch Mill File to a Cambric Needle. It is by far the best Tool Holder in use, and will also answer nearly all the purposes of a Hand Vise. The wood is lignumvitæ and hard maple, the ferrule, malleable iron, and the jaws cast steel. Most hardware dealers keep them, or will send to us for them.

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Manufacture **Barber's Bit Braces, Miller's Falls Vises, Little Giant Iron Cutters, Adjustable Chuck Breast Drills, Family Tool Chests, Pratt's Boiler Tube Scrapers, Patent Angular and Ratchet Drilling Machines, Langdon Mitre Boxes.**

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MANUFACTURED BY

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Send for price list. Buffalo, N.Y.

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These **Vises** are only manufactured at the **HOWARD IRON WORKS,** at **Buffalo, N. Y.** and are so stamped. The improvements in these **Vises** which are patented are valuable, and parties who claim to manufacture, and are offering a **Vise** representing it to be the same as the **HOWARD VISE.** are deceiving the Trade.

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The Fisher & Norris Eagle Anvil Works.

(ESTABLISHED) 1843.

These Anvils are manufactured at the oldest Anvil Factory in this country. They are *superior* to the best English, or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.

The best English Anvils, after a time, become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvils being of crystallized iron, no such settling can ever occur; and the steel face, therefore, remains perfectly true. Also, it has the great advantage, that being of a more *solid* material, and consequently with less rebound, the piece being forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as with a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a *hammer one-fifth lighter* than that required when using a wrought iron anvil which is more elastic.

The working surface is in *one piece* of JESSUP'S BEST TOOL CAST STEEL, which, after being accurately ground, is hardened and given the proper temper for the heaviest work. The *horn* is covered with and its extremity made *entirely of steel.* The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is *warranted to be thoroughly welded and not to come off.*

REDUCED PRICE LIST. ANVILS weighing 100 lbs. to 800 lbs., 11c. per lb.

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	No. 0	1	2	3	4	5	6	7	8	9
Weighing about	10 lb.	15 lb.	20 lb.	30 lb.	40 lb.	50 lb.	60 lb.	70 lb.	80 lb.	90 lb.
Price,	$3·50	$4·25	$5·00	$5·50	$6·50	$7·50	$8·00	$9·00	$10·00	$10·50

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Sole Manufacturers of

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Manufacturers of **OAK TANNED**

LeatherBelting

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ADDRESS MUNTON'S GOVERNOR CO. LAWRENCE MASS.

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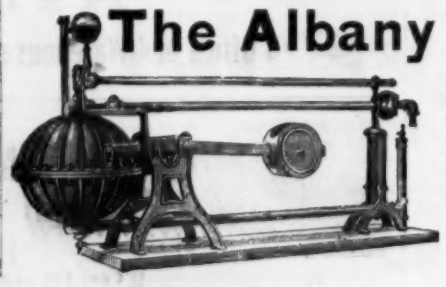
The Albany Steam Trap.



This Trap automatically drains the water of condensation from *Heating Coils,* and returns the same to the Boiler *whether* the Coils are *above or below* the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

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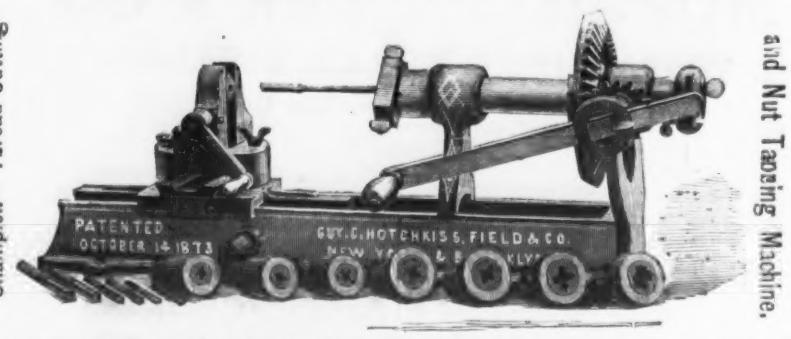

and Nut Tapping Machine.

This machine has revolving and sliding jams, which enables the operator to cut all kinds work, no matter how irregular in shape it may be. It cuts a perfect thread at once going over. As much work can be done in one hour by this machine as in a day with stocks and dies. Send for Circular.

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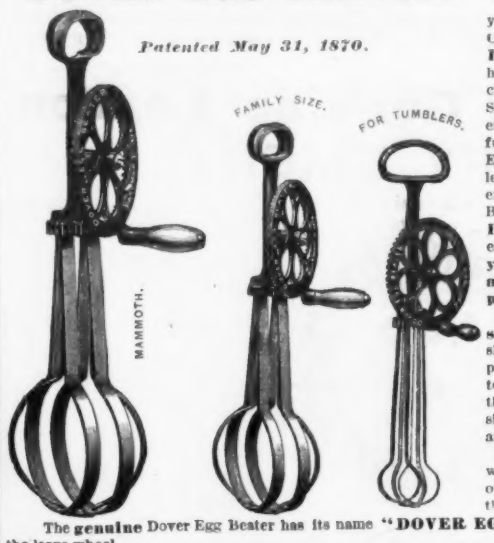
Patented May 31, 1870.



Special Notice to the trade.

The long contested suit (more than two years' in court) Monroe vs. Dover Stamping Co., which was brought to **destroy** the **DOVER EGG BEATER PATENT,** has been **decided in our favor** (see decision of the Circuit Court of the United States, Sept. 3, 1874, Shepley, judge), thus ending disastrously to our opponents, and fully vindicating the integrity of the Dover Egg Beater Patent, which we shall maintain legally against all who infringe the same or either of our seven other patents on Egg Beaters. **Imitations** of our **Dover Egg Beaters** or either of the Egg Beaters covered by our Patents, **manufactured beyond the limits of the United States, and brought here for sale, will be promptly and severely dealt with.**

All persons are cautioned against **buying, selling** or **using** such infringements, as we shall prosecute all concerned in the illegal practice. We have already commenced suits to suppress the **manufacture** and **sale** of the so-called **PEERLESS BEATER,** and shall require all who infringe our rights to answer legally for their acts.

Remember that **buying** and **selling** as well as **manufacturing** any infringements of our Patents exposes one to **three times** the damages awarded by a jury.

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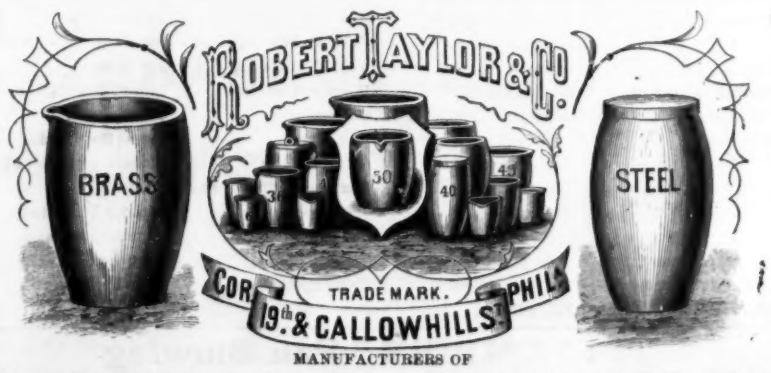

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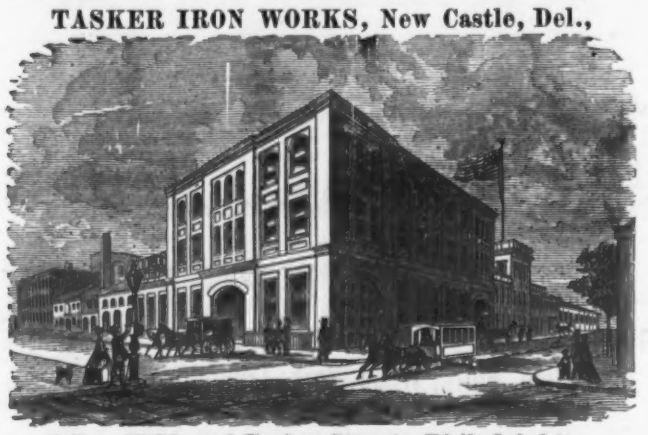

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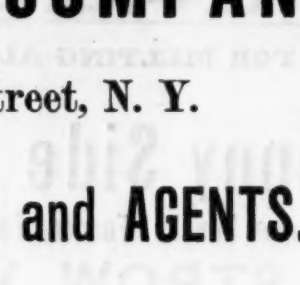

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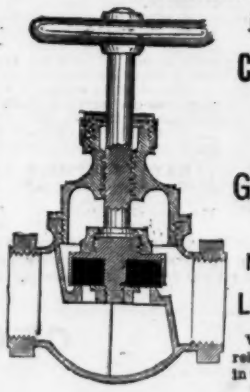

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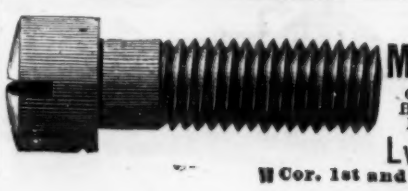

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Kendrick & Runkle, Trenton, N. J. 38
Taylor S. G., 98 Indiana, Chicago 34
Wyatt Thos., 7th Eddy, Providence, R. I. 33

Chisels, *Manufacturers of.*
Barton D. R., Rochester, N. Y. 26
Buck Bros., Millbury, Mass. 2

Coal- *Miners of.*
Pardee A. & Co., 111 Broadway, N. Y. 31

Coal Vases.
Sidney Shepard & Co., Buffalo, N. Y. 27

Coal Hods, *Manufacturers of.*
Easterbrook Wm., 311 Cherry, Phila. 36
Smith, Burns & Co., 46 Cliff, N. Y. 30

Coffee and Spice Mills.
Lane Brothers, Millbrook, N. Y. 3
Enterprise Mfg. Co., Philadelphia, Pa. 30

Commission Merchants, *English.*
Goddard Samuel A. & Co., Birmingham, Eng. 28

Compasses and Dividers, *Manufacturers of.*
Bemis & Call Hardw. & Tool Co., Springfield, Mass 10

Cooper's Tools, etc., *Dealers in.*
Little Chas. E., 59 Fulton N. Y. 7

Crucibles, *Manufacturers of.*
Newkumet Adam, 1537 N. Front, Phila. 28
Strow, Wile & Co., 709 Market, Phila. 24
Taylor Robert & Co., 1900 to 1906 Callowhill, Phila. 24

Curry Combs, *Manufacturers of.*
Bartholomew G. W. & H. S., Bristol, Ct. 12
Kellogg W. P. & Co., Troy, N. Y. 22
Lawrence Curry Comb Co., 382 2d Avenue, N. Y. 22

Cutlery, *Importers of.*
Boker Hermann & Co., 101 Duane, N. Y. 26
Fisher Jos. S., 411 Commerce, Phila. 11
King, Briggs & Co., 80 Chambers, N. Y. 11
Peace Chas. Jr., 82 Chambers, N. Y. 11
Peters Bros., 68 Chambers, N. Y. 11
Tillmes A. & Co., 521 Commerce, Phila. 11
Ward Asline, 101 Duane, N. Y. 1
Wilson Hawksworth, Ellison & Co., 72 John, N. Y. 32

Cutlery, *Manufacturers of.*
Burdsall & Aaron, Peppernell, Mass. 11
John Russell Cutlery Co., Turners Falls, Mass. 11
Meriden Cutlery Co., 49 Chambers, N. Y. 11
Miller Bros. Cutlery Co., W. Meriden, Conn. 11
Northampton Cutlery Co., 55 Murray, N. Y. 11
New York Knife Co., Walden, N. Y. 11
Woods Cutlery Co., Antrim, N. H. 11

Differential Pulley Blocks, *Makers of.*
Van Wart & McCoy, 43 Chambers, N. Y. 35

Door and Gate Springs.
The Challenge Door Spring Co., 49 Ann. N. Y. 20
Van Wagoner & Williams, 27 Park Row 36

Dredging, *and Makers of Dredging Machines.*
Am. Dredging Co., 10 S. Delaware ave., Phila. 35

Drill Chucks, *Manufacturers of.*
Lambertville Iron Works, Lambertville, N. J. 35

Drilling Machines. *Makers of.*
Miller Falls Co., 78 Beekman, N. Y. 34
Thorne & DeHaven, Philadelphia 31

Drop Forgings.
Phila. Forging Works, 1203 to 1207 E. Thompson, Philadelphia 34

Edge Tools. *Makers of.*
Barton D. R., Rochester, N. Y. 29
Bradley G. W., 37 Chambers, N. Y. 7

Egg Beaters. *Manufacturers of.*
Dover Stamping Co., 83 North, Boston 21

Elevators. *Makers of.*
Howard Geo. C., 17 S. 18th, Phila. 36
Otis Bros. & Co., 348 Broadway, N. Y. 9

Emery.
Abbott & Howard, New York and Boston 31
The Union Stone Co., 6 Exchange, Boston 28

Emery Cloth.
The Union Stone Co., 6 Exchange, Boston 28

Emery Wheels. *Makers of.*
Lehigh Valley Emery Wheel Co., Wiessport, Pa. 28
The Union Stone Co., 6 Exchange, Boston 28

Endless Lever House and Weight Movers.
Reamy Truck Co., Baltimore, Md. 28

Engineers, Machinists, etc.
Henshall James, 1056 Beach, Phila. 36
Moore James, cor. 16th and Buttonwood, Phila. 30

Engines, Steam. *Makers of.*
Haskins' Machine Co., Fitchburg, Mass. 35
New York Steam Engine Co. 98 Chambers, N. Y. 35
Shapley & Wells, Binghamton, N. Y. 26
Tanner Wm. E. & Co., Richmond, Va. 16
Woodruff Iron Works, Hartford, Conn. 34

Exporters.
Keuffel & Esser, 111 Fulton, N. Y. 36

Faucets, *Self-Measuring, Makers of.*
Enterprise Mfg. Co., of Pa., Phila. and N. Y. 30

Files, *Importers of.*
Carr J. & Riley 82 John, N. Y. 32
Dickinson Henry, 66 and 68 Reade, N. Y. 11
Fisher Joseph S., 411 Commerce, Phila. 11
Frasse Peter A. & Co. 95 Fulton, N. Y. 8
Moss F. W., 80 John, N. Y. 32
Sanderson Bros. & Co., 16 Cliff, N. Y. 32
Spear & Jackson, 116 Duane, N. Y. 29

Files, *Manufacturers of.*
Adamantine File Works, Providence, R. I. 18
American File Co., Pawtucket, R. I. 8
Auburn File Works, Auburn, N. Y. 6
Barnett G. & H., 41 and 43 Richmond, Phila. 6
McCaffrey & Bro., 1732 and 1734 N. 4th, Phila. 6
Nicholson File Co., Providence, R. I. 6
Wheeler, Clemson & Co., Middletown, N. Y. 10
Walsh, Coulter & Flagler, 83 Chambers, N. Y. 8
Western File Works, Beaver Falls, Pa. 6

Fire Brick, *Makers of.*
Brooklyn Clay Retort and Fire Brick Works, Van Dyke, St., Brooklyn, N. Y. 28
Hall A. & Sons, Perth Amboy, N. J. 28
Hall A. & Sons, Buffalo, N. Y. 28
Kreischer B. & Son, 58 Goerck, N. Y. 29
Newkumet Philip, 23d and Vine, Phila. 28
Newton & Co., Albany, N. Y. 28
Salamander Works of Woodbridge, N. J., foot of Bethune St., N. Y. 28
Watson John R. Perth Amboy, N. J. 28

Fluting Machines.
Myers Mfg. Co., 200 Centre, N. Y. 7

Flint and Emery Paper and Cloth.
Baeder, Adamson & Co., 720 Market, Phila. 11

Founders and Machinists.
Garrison A. & Co., Pittsburgh, Pa. 4

Galvanized Iron.
Lefferts Marshall Jr., 90 Beekman, N. Y. 4
Whitnum S., Greenpoint, L. I. 4

Giant Nail Extractor.
Maltby, Curtiss & Co., Waterbury, Ct. 34

Glass, *Importers of.*
Downing A. C. & Co., 57 Beekman, N. Y. 27

Governors.
Bourdman E. Palmer & Co., Lawrence, Mass. 29
Shive Governer Co., Bethlehem, Pa. 34

Grindstones.
Wood Walter R., 283 and 285 Front, N. Y. 28
Wortnington & Sons, North Amherst, O. 32

Guns, &c.
Schoverling & Daly, 84 Chamber St. 21
Tryon Edw. K., Jr., & Co., 19 N. Sixth, Philadelphia. 5
Windmuller Louis & Roelker, 20 Reade N. Y. 16

Gunpowder, *Makers of.*
Kneeland F. L. (Dupont) 70 Wall, N. Y. 32
Laflin & Rand Powder Co., 21 Park Row, N. Y. 34

Hammers, etc., *Manufacturers of.*
Emmet Hammer Co., Brooklyn, E. D., N. Y. 2

Hardware, *Brass and Galvanized.*
Tiebout W. & J., 290 Pearl, N. Y. 2

Hardware Commission Merchants.
Fernald & Sise, 100 Chambers, N. Y. 26
Green R. M. & Co., 100 Chambers, N. Y. 31
Graham & Haines, 88 Chambers, N. Y. 30
Maltby, Curtis & Co., 62 Reade, N. Y. 34
Waldridge Geo. B., 99 Chambers, N. Y. 27
Walsh, Coulter & Flagler, 83 Chambers, N. Y. 8
Wilson J. Clark & Co., 81 Beekman, N. Y. 20

Hardware Dealers.
Lloyd, Supplee & Walton, 625 Market, Phila. 10
Quackenbush, Townsend & Co., 59 Reade, N. Y. 29
Shepard Sidney & Co., Buffalo N. Y. 27
Wilson J. Clark & Co., 81 Beekman, N. Y. 20

Hardware Importers.
Boker Hermann & Co., 101 Duane, N. Y. 29
Field Alfred & Co., 93 Chambers, N. Y. 29
King, Briggs & Co., 80 Chambers, N. Y. 10
Frith E., 16 Cliff, N. Y. 10
Van Wart & McCoy, 43 Chambers, N. Y. 10
Turnor E. A., 37 Chambers, N. Y. 11
Windmuller Louis & Roelker 20 Reade N. Y. 16

Hardware Manufacturers.
Buffalo Hardware Co., Buffalo, N. Y. 8
Enterprise Mfg. Co., Phila. 30
Hart, Bliven & Mead Mfg. Co., 243 Pearl, N. Y. 30
Jacobus & Nimick Mfg. Co., 96 Chambers, N. Y. 30
Kellogg Wm. P. & Co., Troy, N. Y. 20
Lane, Gale & Co., Troy, N. Y. 30
Many & Marshall, 48 Warren, N. Y. 18
Middletown Tool Co., 82 Chambers, N. Y. 29
Miller's Falls Mfg. Co., 78 Beekman, N. Y. 21
Pratt & Co., Buffalo, N. Y. 27
Providence Tool Co., Providence, R. I. 18
Schweitzer Mfg. Co., 57 Reade, N. Y. 30
Shattuck W. F. & Co., 113 Chambers, N. Y. 8
Stanley Works, 79 Chambers, N. Y. 29
Union Mfg. Co., 99 Chambers, N. Y. 7
Williams, White & Churchill, 73 Warren, N. Y. 22
Wilson Mfg. Co., 37 Chambers, N. Y. 12

Hardware Specialties.
Bracher T. W., 77 Greene, N. Y. 20
Byington & Northup Rochelle, Ills. 2
Goodnow & Wightman, 23 Cornhill, Boston 29
Markt & Co., 139 Centre, N. Y. 31
Post C. C., Burlington, Vt. 10
Pugsley & Chapman, 6 Gold, N. Y. 36
Shepard Sidney & Co., Buffalo, N. Y. 27
Wiley & Russell, Greenfield, Mass 31

Hog Ringers, *Manufacturers of.*
Hill H. W. & Co., Decatur Ills. 8

Hoisting Engines, *Makers of.*
Howard Geo. C., 17 S. 18th, Philadelphia 36
Otis Bros. & Co., 348 Broadway, N. Y. 8

Horse Hay Forks and Fixtures, *Makers of.*
Nellis A. J. & Co., Pittsburgh, Pa. 36

Horse Nails, *Makers of.*
Ausable Horse Nail Co., 35 Chambers, N. Y. 28
Brundage & Co., Middletown, N. Y. 10
Globe Nail Co., Boston, Mass. 28
Pratt & Co., Buffalo, N. Y. 27
Putnam S. S. & Co., Neponset, Mass. 10

Horse Shoes, *Makers of.*
Burden Iron Works, Troy, N. Y. 4

House Furnishing Goods.
Bracher T. W., 77 Greene, N. Y. 20
Tuft & Howard, 13 Murray, N. Y. 30

Huskers.
Parks Bros., Princeton, Ills. 27

Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y. 34

Insurance, Boiler.
Hartford Steam Boiler Inspection and Insurance Co. 32

Iron Brokers.
Boynton Geo. A., 70 Wall, N. Y. 4
Crane U. O., 104 John, N. Y. 4
Hazard & Jones, 204 Pearl, N. Y. 4
Read & Dickey, Cleveland, O. 34

Iron, Corrugated, *Manufacturers of.*
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y. 4

Iron, Charcoal, *Warm or Cold Blast.*
Quincy John W., 98 William, N. Y. 4

Iron Commission Merchants.
Althouse Geo. D., 341 Walnut, Philadelphia 5
Blakiston & Cox, 333 Walnut, Phila. 5
Colt Edward W., 205½ Walnut, Philadelphia 4
Hand Jas. C. & Co., 614 and 616 Market, Phila. 18
Hoopes W. Graham, 419 Walnut, Phila. 5
Malin Bros., 228 Dock, Phila. 5

Iron, Pig, *Importers of.*
Williamson James & Co., 69 Wall, N. Y. 4

Iron Dealers.
Abeel Brothers, 190 South, N. Y. 4
Bonnell, Botsford & Co., Youngstown, O. 4
Borden & Lovell, 70 and 71 West, N. Y. 4
Cleveland, Brown & Co., Cleveland, O. 6
Coddington T. B. & Co., 25 Cliff, N. Y. 4
Conklin & Huerstel, 99 Market Slip, N. Y. 4
Fuller, Lord & Co., 139 Greenwich, N. Y. 4
Fuller, Dana & Fitz, 110 North, Boston 2
Gardner Wm., 575 Grand, N. Y. 4
Harrison & Gilloon, 558 to 562 Water, N. Y. 4
Holden, Hopkins & Stokes, 104 John, N. Y. 4
Jackson & Chase, 206 and 208 Franklin, N. Y. 4
Judson B. F., 417 and 419 Water, N. Y. 4
Matthews Chas. W., 133 Walnut, Phila. 5
Mohr J. J., Philadelphia 4
Packard, Goff & Co., Youngstown, O. 4
Pettee & Mann, 228 and 229 South, N. Y. 4
Pierson & Co., 24 Broadway, N. Y. 4
Quincy John W., 98 William, N. Y. 4
Richards D. W. & Co., 92 Mangin St., N. Y. 4
Richardson J. O., 329 Walnut, Philadelphia 5
Smith Gam'l G. & Co., 242 Pearl, N. Y. 4
Stroul Wm., Lawrence, 104 John, N. Y. 4
Wallace Wm. H. & Co., Albany and Washington streets, N. Y. 4
Warner A. B. & Sons, 28 and 29 West, N. Y. 4
Williamson James & Co., 69 Wall, N. Y. 4
Whitney A. R. & Co., 58 Hudson N. Y. 4

Iron, *Manufacturers of.*
Britannia Iron Works, Middlesbro', Eng. 6
Burden Iron Works, Troy, N. Y. 4
Cleveland Rolling Mill Co., Cleveland, O. 6
Coffin Wm. E. & Co., 8 Oliver, Boston 4
Boston Rolling Mills, 17 Batterymarch, Boston 4
Everson, Macrum & Co., Pittsburgh, Pa. 4
Fulton S. & Co., 242 S. Third, Phila. 5
Girard Rolling Mill Co., Girard, O. 4
Leonard John, 450 & 451 West st., N. Y. 4
Milwaukee Iron Co., Milwaukee, Wis. 6
Naylor & Co., 6 Oliver, Boston 4
New Haven Rolling Mill Co., New Haven, Ct. 6
Old Dominion Iron & Nail Works Co., Richmond, Va. 6
Oxford Iron Co., 81 Washington, N. Y. 4
Phœnix Iron Co., 410 Walnut, Phila. 5
Rowland Wm. & Harvey, Phila. 36
Shoenberger & Co., Pittsburgh, Pa. 4

Iron, Swedish, *Importers of.*
Jessop Wm. & Sons, 91 and 93 John, N. Y. 32
Mitander Nils, 69 William, N. Y. 4

Keys and Cutters. *Manufacturers of.*
Barnes Geo. & Co., Syracuse, N. Y. 22

Lace Leather, *Manufacturers of.*
Fales Geo. S., Pawtucket, R. I. 21

Lamps. *Manufacturers of.*
Patent Mechanical Lamp Co., 138 Chambers, N. Y. 34

Lapterns. *Manufacturers of.*
Dietz R. E., (Tubular) 54 and 56 Fulton, N. Y. 36
Howard & Morse, 45 Fulton, N. Y. 2

Lead Pipe, &c., *Manufacturers of.*
Bayley, Farrell & Co., Pittsburgh, Pa. 2

Locks, *Manufacturers of.*
Bohannan Wilson, Broadway and Kosauth, Brooklyn, E. D. 26
Branford Lock Works, Branford, Conn. 30
D. K. Miller Lock Co., 713 Cherry, Philadelphia 26
Romer & Co., Newark, N. J. 11
Trenton Lock Co., 48 Warren, N. Y. 18
Yale Lock Mfg. Co., 298 Broadway, N. Y. 6

Machinery. *Makers of.*
Bement Wm. B. & Son, Philadelphia 26
Chapin Machine Co., New Hartford, Ct. 35
Goodspeed & Wyman, Winchendon, Mass. 34
Pratt & Whitney Co., Hartford, Conn. 34
Sellers Wm. & Co., 1600 Hamilton, Phila. 26
Watson Andrew, 537 Dickinson, Phila 26
Wetherill Robert & Co., Chester, Pa. 34
Whittier Machine Co., 1176 Front, Boston, Mass. 34
Wood Thomas, 2106 Wood, Phila. 26

Machine Screws, *Makers of.*
American Screw Co., Providence, R. I. 18
Lyon & Fellows Mfg. Co., Williamsburg, N. Y. 22
Rochester Machine Screw Co., Rochester, N. Y. 18

Machinists' Tools. *Makers of.*
Blaisdell P. & Co., Worcester Mass. 24
Harrington Edwin & Son, 15th st. and Pa. ave., Phila. 34

Machinery and Tool *Importers of.*
Graham Bros., 122 Cannon street, London, E. C. 33

Mathematical Instruments.
Keuffel & Esser, 111 Fulton, N. Y. 36

Measuring Tapes.
Eddy Geo. & Co., 363 Classon Ave., Brooklyn, N. Y. 24

Meat Cutters. *Makers of.*
Whittemore D. H. Worcester, Mass. 38

Metal Dealers and Brokers.
Coddington T. B. & Co., 25 and 27 Cliff, N. Y. 2
Colt Edward W., 205½ Walnut, Phila. 4
Cort N. L. & Co., 220 & 222 Water, N. Y. 2
Crane U. O., 104 John, N. Y. 4
Gregg H. L. Co., 108 Walnut, Phila. 5
Phelps, Dodge & Co., Cliff, bet. John & Fulton, N. Y. 2
Purves A. & Son, cor. South and Penn, Phila. 16
Quincy J. W., 98 William, N. Y. 2
Sturges Frank & Co., 72, 74 & 76 Lake, Chicago 3
Thomson A. A. & Co., 213 and 215 Water, N. Y. 2
Van Wart & McCoy, 43 Chambers, N. Y. 2

Metallurgists.
Britton J. Blodgett, 339 Walnut, Phila. 5
Drown Thomas M., Lafayette College, Easton, Pa. 5
Maynard & Van Rensselaer, 21 Cliff, N. Y. 5
School of Mines, E. 49th, N. Y. 5

Mining Spikes
Roseberry Geo. D., Pottsville, Pa. 4

Miner's Candles, *Makers of.*
Joseph Boyd's Sons, 12 Franklin, N. Y. 27

Molding Machines, *Makers of*
Corbin P. & F., New Britain, Ct. 30

Molders' Tools.
Carter H., 230 Pearl, N. Y. 10

Mop Heads. *Manufacturers of.*
Buffalo Hardware Co., Buffalo, N. Y. 8

Mouse Traps, Catchemalive, *Makers of.*
Dietz R. E., 54 and 56 Fulton, N. Y. 36

Nickel Platers.
Hartman John, 1042 Ridge avenue, Philadelphia 9
New York Nickel Plating Co., 135 West 24th, N. Y. 9

Norway Shapes, *Rollers of.*
Rowland Wm. & Harvey, Frankford, Phila. 36

Note Broker.
Gallaudet P. W., 3 and 5 Wall, N. Y. 3

Nuts, Bolts, etc., *Makers of*
American Bolt Co., 210 Lawrence, Lowell, Mass. 13
Arms, Bell & Co., Youngstown, O. 32
Carpenter David, 402 Water N. Y. 4
Clark Bros. & Co., Milldale, Conn. 12
Fuller, Lord & Co., 139 Greenwich, N. Y. 4
Haskell W. H. & Co., Pawtucket, R. I. 12
Lewis, Oliver & Phillips, Pittsburgh, Pa. 13
Old Colony Rivet Works, 116 Chambers, N. Y. 12
Roseberry Geo. D., Pottsville, Pa. 5
Russell, Birdsall & Ward, Port Chester, N. Y. 36
Plumb, Burdict & Barnard, Buffalo, N. Y. 36
Sternbergh J. H., Reading, Pa. 12
Union Nut Co., 73 Beekman N. Y. 22

Oilers, *Makers of.*
Austin J. & Co., 168 Fulton, N. Y. 12

Old Iron, etc.
Gregg H. L. & Co., 108 Walnut, Philadelphia 5

Ore Crushers.
Blake Crusher Co., New Haven, Ct. 34

Packing for Engines, &c., *Manufacturers of.*
Glanding Jas. & Co., 115 Queen, Philadelphia 11

Paints.
Rocky Mountain Vermillion Paint Co., Prov., R. I. 28

Paints and Oils, *Dealers in.*
Devoe F. W. & Co., 117 Fulton, N. Y. ....

Patent Solicitors.
Brieson A. V., 258 Broadway, N. Y. 16
Howson & Son, Phila. and Washington, D. C. 22
Munn & Co., *Scientific American*, 37 Park Row N. Y. 29

Picture Nails, etc., *Manufacturers of.*
Richards T. C. & Co., 47 Murray, N. Y. 2

Pipes, Fittings, etc., *Makers of.*
Eaton & Cole, 38 John, N. Y. 22
McNab & Harlin Mfg. Co., 56 John, N. Y. 22
Nelson, Finkel & Co., 439 E. 10th st., N. Y. 22
Pancoast & Maule, 227 Pear, Phila. 22

Pipe Threaders, Cutters, &c.
Converse, M. D., 68 Park Place, N. Y. 20
Empire Mfg. Co., 18 William, N. Y. 9

Pipe, Water and Gas, *Makers of.*
Brick R. A. & Co., 112 Leonard, N. Y. 6
McNeal John & Sons, Burlington, N. J. 6
Morris, Tasker & Co., 15 Gold, N. Y. 22
National Tube Works Co., 78 William, N. Y. 22
Starr Jesse W. & Sons, Camden, N. J. 6
Warren Foundry & Mach. Co., Phillipsburg, N. J. 22
Wood R. D. & Co., 178 Broadway, N. Y. 24

Piston Packing.
Canfield John & Co., 1821 Fairmount Ave., Phila. 6

Plane Irons. *Manufacturers of*
Buck Bros., Millbury, Mass. 2
H. Chapin's Son, Pine Meadow, Conn 6
Middletown Tool Co., Middletown, Conn. 29

Planes. *Manufacturers of.*
H. Chapin's Son Pine Meadow, Conn 6
Greenfield Tool Co., Greenfield, Mass. 31
Stanley Rule & Level Co., 36 Chambers, N. Y. 29

Plated Ware
Rogers & Bro., 208 Broadway 11

Plumbago Lubricator.
N. Y. Black Lead Works, 172 Forsyth, N. Y. 36

Plumbers' Materials, *Manufacturers of*
Carr Wm. S. & Co., 106 Centre, N. Y. 22

Portable and Stationary Forges
Kellogg Wm. P. & Co., 121 Chambers N. Y. 24
Keystone Portable Forge Co., 120 Exchange place, Philadelphia. 6
Manning H. S. & Co., 111 Liberty, N. Y. 6

Presses, Power. *Makers of.*
The Stiles & Parker Press Co., Middletown, Ct. 28

Pressure Blowers. *Makers of.*
Sturtevant B. F., 72 Sudbury, Boston 25

Pulsometer Pumps.
Hall C. Henry & Co., 20 Cortlandt, N. Y. 33

Pumps, *Makers of.*
Burlingham & Purdy, 168 Chambers St. ....
Douglas W. & B., Middletown, Conn. ....
Union Mfg. Co., 99 Chambers, N. Y. 7
Valley Mch. Co., Easthampton, Mass. ....

Pyrometers.
Brown Edward, 311 Walnut, Phila. ....

Railroad Supplies.
Potter, Hoffman & Co., 110 Liberty, N. Y. 6

Rails, *Importers of.*
Congreve Chas. & Son, 104 and 106 John, N. Y. 22

Rails, Iron or Steel, *Makers of.*
Atkins Bros., Pottsville, Pa. 6
Cambria Iron Co., Johnstown, Pa. 5
Cleveland Rolling Mill Co., Cleveland, O. 6
Griswold John A. & Co., Troy, N. Y. 32
Milwaukee Iron Co., Milwaukee, Wis. 6

Razor Strops, *Makers of.*
B. F. Badger, Charlestown, Mass. 5

Revolvers.
Tryon E. K., Jr., & Co., 320 N. 3d, Philadelphia 34

Rivets.
Old Colony Rivet Works, 116 Chambers, N. Y. 12
Timmes Peter, 231 North 6th, Brooklyn, E. D. 4

Road Scrapers, &c., *Makers of.*
Revolving Scraper Co., Columbus, O. 24

Rolling Mill Machinery, etc., *Manufacturers of.*
Birmingham Iron Foundry, Birmingham, Ct. 4
Moore James, Cor 16th and Buttonwood, Phila. 29

Rules, *Manufacturers of.*
H. Chapin's Son, Pine Meadow, Ct. 6
Stanley Rule and Level Co., 35 Chambers St. 22

Sash Weights (sectional), *Manufacturers of.*
Sprague Sash Weight Co., Youngstown, O. 2

Saws. *Makers of.*
Atkins E. C. & Co., Indianapolis, Ind. 10
Boynton E. M., 80 Beekman, N. Y. 10
Flint J. & Co., Rochester, N. Y. 10
Disston Henry & Sons, Phila. 25
James Ohlen, Columbus, O. 10
Peace Harvey W., Williamsburg, N. Y. 10
Spear & Jackson, 116 Duane, N. Y. 29
Wheeler, Madden & Clemson, Middletown, N. Y. 10

Saw Frames, Wood, *Makers of.*
Boynton E. M. 80 Beekman, N. Y. 10
Peace Harvey W., Williamsburg, N. Y. 10

Scales. *Manufacturers of.*
Richie Bros., 9th near Coates, Phila. 24
Shattuck W. F. & Co., 113 Chambers, N. Y. 8
Universal Family Scale Co., Guilford, Conn. 13

Screws. *Makers of.*
American Screw Co., Providence, R. I. 13
Miles F. S., 205 Quarry, Phila. 12

Screws, *Importers of.*
Bruce Geo. W., 1 Platt, N. Y. 5
Field Alfred & Co., 93 Chambers, N. Y. 9
Guental George & Son, 39 W. 4th, N. Y. 10

Shovels, &c.
Clement & Hawks Mfg. Co., Northampton, Mass. 8
Middleboro Shovel Co., 63 Oliver, Boston 30
N. Y. Shovel Works (Screening Shovels), 1558 Broadway, N. Y. 8

Skates.
Barney E. H., Springfield, Mass. 3
Florence Sewing Machine Co., Florence, Mass. 13
Graham & Haines, 88 Chambers, N. Y. 30
Patterson Bros., 21 Park Row, N. Y. 27
Peck & Snyder, 126 Nassau, N. Y. 9
Union Hardware Co., 120 Chambers, N. Y. 26

Smelting Works.
Reeves Paul S., 700 South Broad St., Phila. 36
Du Plaine & Co., 1303 & 1305 Buttonwood, Phila. 9

Stamped and Japanned Tin Ware.
Scheider Jos. & Co., 58 Beekman, N. Y. 6
Shepard Sidney & Co., Buffalo, N. Y. 27
Sturges Frank & Co., 72, 74 & 76 Lake, Chicago 3

Steam Hammers, etc., *Makers of.*
Dudgeon Richard, 24 Columbia, N. Y. 34

Snaps, Harness, *Makers of.*
Middletown Tool Co., Middletown, Conn. 29

Spiegel.
Quincy John W., 98 William, N. Y. 2

Spikes, R. R. &c., *Manufacturers of*
Fahrion, G. W., Niles, Ohio 4
Starke Adolph, 441 East 10th, N. Y. 4

Springs.
Rowland Wm. & Harvey, Frankford, Phila. 36

Squares, Steel and Iron, *Makers of.*
Hart, Bliven & Mead Mfg. Co., 243 Pearl, N. Y. 30

Steam Pumps, etc., *Manufacturers of*
Carr A. 43 Cortlandt, N. Y. 30
Enterprise Hydraulic Works, 2218 Race St., Phila. 34
Guild & Garrison, Williamsburgh, N. Y. 34
Hall C. Henry & Co., 20 Cortlandt, N. Y. 34
Philadelphia Hydraulic Works, cor. Evelina and Levant, Philadelphia 35
Steele & Condict, 88 Liberty, N. Y. 29

Steam Traps.
Jones Alonzo L., 51 S. 4th, Phila. 12
Richards & Pike, 205 Ledger Place, Philadelphia 36
Townsend & Blessing, Albany, N. Y. 21

Steel Castings.
The McHaffie Steel Castings Co., Evelina and Levant Streets, Philadelphia 16

Steel Importers.
Carr J. & Riley, 82 John, N. Y. 32
Cocker Bros., Sheffield, England 32
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Hobson Francis & Son, 97 John, N. Y. 32
Jessop Wm. & Sons, 91 and 93 John, N. Y. 32
Moss F. W., 80 John, N. Y. 32
Piersons & Co., 24 Broadway, N. Y. 4
Sanderson Bros. & Co., 16 Cliff, N. Y. 32
Sanderson Geo. & Co., 97 John, N. Y. 32
Van Wart & McCoy, 43 Chambers, N. Y. 32
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Shepard Sidney & Co., Buffalo, N. Y. 27

Stove Polish, *Makers of.

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Distribution of Heat Developed by Collision.

The following account of a very curious and striking phenomenon, observed during the forging of the 250 kilogramme ingot of platinum iridium, made for the standard meter, was communicated to the French Academy, on June 8th, by the distinguished engineer and metallurgist, M. Tresca. We take the translation given below from *Nature*, No. 255:

Many of our colleagues who have become aware of a fact in thermodynamics, which it has been in our power recently to observe, think it possessed of so great an interest that I ought immediately to announce it to the academy. It is as follows:

During the forging, which has been very successful, of the ingot of platinum-iridium for the standard meter, I at first remarked that it sometimes produced, under the action of the hammer, luminous streaks, having an oblique direction upon the lateral faces of the piece, when this, while cooling, was yet at the temperature of a dull red. I showed some of these effects to M. Fizeau, but they were then incomplete, and I have only lately succeeded in obtaining a good observation of the phenomenon, and in defining its character with perfect certainty.

It is known that when a bar of metal is lengthened by means or a powerful hammer on an anvil of the same form as the head of the latter, each blow produces, above and below, a symmetrical contraction, the effect of which is to give to the bar the aspect of a series of projections separated by small level spaces.

At the time of the collision, these spaces, which are formed before and behind the impress of the hammer, upon the upper and the lower faces of the bar, are connected, at a certain moment, upon the lateral faces by luminous lines passing from the one to the other, and presenting altogether the appearance of an X written in lines of fire. The phenomenon is only visible for a certain temperature of the bar which is being wrought, but then each blow invariably produces its effect, and, in consequence of the confused mingling of the imprints, we see the entanglement of these crossed lines which encroach upon each other. These brilliant bands appear at the same moment as the collision, but they do not disappear with it, and their continuance was sufficiently prolonged to enable us to count six luminous cross-bars visible at one time, although developed by six successive blows of the hammer.

I have been able, moreover, to get this persistence confirmed by several persons in the foundries of M. Farcot, who, with the greatest kindness, placed his services at the disposal of the Metric Commission for the execution of the work.

Although the lines of the cross bars appeared to us all rectilinear, and although we could not compare them to anything better than two series of straight lines, parallel and intercrossed, we think it will be indispensable to determine their form more exactly by appropriate processes, and to discuss it with the greatest care.

It is well known that hammering develops heat in the bodies hammered; thermodynamics teaches us that these thermal effects ought to be regarded as the result of mechanical work or of *demi-force vive* exerted during the collision, but the precise place in which the calorific development is produced has not yet been noticed.

For ourselves, we do not hesitate to affirm that the zone which becomes luminous is that along which the matter mainly flows at the moment when the change of form takes place, according to a law which we were enabled to discover in our previous researches in molecular displacements. If this first indication should be confirmed, there would be thus obtained a more exact knowledge of the mode of distortion determined by the forging, and the phenomenon which we describe would evidently form a new scientific connection between thermodynamics and the question with which we ourselves are personally occupied under the title of "Flowing of Solid Bodies."

The phenomenon ought to be the same for all metals, and we have already ventured to hazard some considerations of the particular causes of the brightness which it presented in the case of platinum, and which has not, so far as we know, been yet observed in any other forging.

The exceptional hardness of the platinum-iridium, cooled to a dull red heat, requires, for an equal distortion, an amount of work at least equivalent to that of the forging of steel, and in consequence of the relative smallness of the calorific capacity of this alloy, this same work ought to be converted into calorific phenomena, more localized and more intense. Moreover, the material is more homogeneous than iron, and is notable for a kind of remarkable translucency which makes one believe that the eye can follow the shade of red to a certain depth. The effects, whatever they may be, are thus rendered more manifest, more especially as they are not accompanied by any exudation of foreign matter, nor by any oxidation of the surface. All these circumstances are eminently favorable to the observation which chance permitted us to make, and which, once confirmed in the case of platinum, may certainly be renewed with other metals, although possibly in a more restricted manner than in the case of the alloy of MM. Deville and Debray.

We confine ourselves for the present to a summary indication of the principal fact, which appears to us to have a certain importance, and which consists in this appearance of luminous bands which arise from collision, and the position of which enables us to fix the precise place where is developed the heat which represents under another form the work done by motion; this fact is, perhaps, of a nature to open some new path for the researches, so carefully made, of the physicists of our epoch on all that touches on molecular mechanics and on the caloric actions which are connected with them.

The ingot of platinum has already been brought into the form of a bar with a square section of 4·50 m. in length; there will be a chance of continuing the same observations in the new operations of forging to which it will be submitted. The chance of renewing them may perhaps not again be offered.

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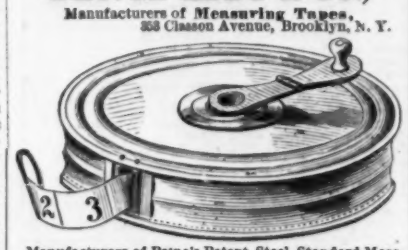

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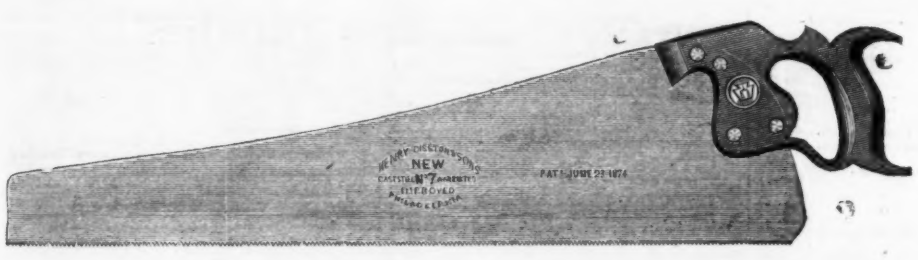
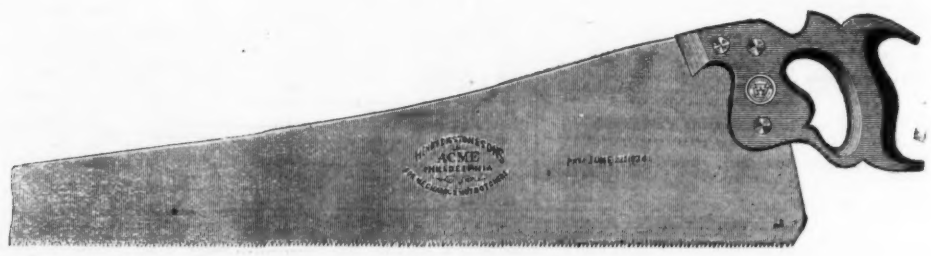
HENRY DISSTON & SONS desire to call the attention of the Hardware Trade, also the Mechanics of this Country, to their





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Snell Mfg. Co.....dis 15 @ 20 %
Russell Jennings.....dis 10 %
Lewis' Single Twist Bits.....dis 30 %
Andrews' Bits.....dis 25 %
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" " Augers.....dis 50 %
Expansive Bits, Clark's.....$18 @ $26—dis 15 %
" " Ives'.....$20 @ $30—dis 20&10 %
" " Blake's.....$20—dis 25&10&10 %
Hollow Augers, Douglass'.....dis 25&10 %
" " Ives'.....dis 25&10 %
" " French, Swift & Co.....dis 25&10 %
" " Bonney's Adjustable, ₩ doz $48—dis 25 %
" " Stearns'.....₩ doz $48—dis 25 %
" " Ives' Expansive.....each $4·50—dis 40 %
" " Cushman's Expansive.....dis 20 %
Double Cut Gimlet Bits, Shepardson's.....dis 20 %
" " Hartwell's.....dis 50 %
" " Douglass'.....dis 20&10 %
" " Ives'.....dis 25 %
" " Ladd's.....dis 50&10 %
Griswold's Patent.....dis 20 %
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Morse's Bit Stock Drills.....dis 20 %
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" Western.....dis 25 %
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" Western.....dis 20&10 %
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" Sargent's.....dis 50&10&10 %
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" " Stove.....dis 15 %
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Loose Pin.....dis 5&10 %
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Nicholson Blind Butts.....dis 40&10 %
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German Coil.....new list, Jan. 1, dis 25 %
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" " Crossmau.....dis 50&5&10 %
" " Hart Mfg. Co.....dis 60&10 %
" " Merrill.....dis 60&10 %
" Firmers, Douglass.....dis 50&10&10 %
" " Crossman.....dis 50&5&10 %
" " Hart Mfg. Co.....dis 60&5 %
" " Merrill.....dis 60 %
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Cabinet.....dis 60&10 %
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	No. 13	14	15	16	17	18 inch.
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	No. 15	16	17	
Japanned	$9·00	10·50	12·00	per doz
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Increase Wilson's.....new list dis 15 %
Selsor's Pat.....$9·50, $10·50—dis 15 %
French Steel.....dis 15 %
The Swift.....dis 25 %
Compasses and Dividers.
Bemis.....dis 35 %
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Excelsior.....dis 30 %
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Coopers' Tools.
Bradley's.....dis 15 @ 20 %
Chas. E. Little.....dis 20 @ 25 %
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Bradley's.....dis 10 %
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Cast Steel.....₩ ℔ 11c. net
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Gautier & Co.....₩ No. 5½c
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Hotchkiss' and Kellogg's, Iron and Brass...dis 20&10 %
Fitch's.....dis 15&10 %
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American Table.....net list
American Pocket.....dis 25 %
Am. Pocket—Humason & Beckley Mfg. Co...dis 20&10 %
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Britannia.....per doz 7·50—dis 30 %; by bbl. dis 33⅓ %
Cocoa, Plain.....per doz $2·25—dis 20 %
" Rimmed.....per doz 3·75—dis 20 %
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Embossed Gilt.....dis 20 %
Leather.....dis 20 %
Brass.....dis 25 %
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Gray's.....$7·50 ₩ doz—dis 30&10 %
Torrey's Patent.....$7·50 ₩ doz—dis 55 %
Palmer's Japanned No. 6.....₩ doz $5·00
" Coppered " " 6·00 } dis 20 %
" Silvered " " 8·00
Challenge.—
Japanned.....₩ doz $4 00 @ 6 00
Bronzed.....₩ doz 5 00 @ 7 00 } dis 25 %
Nickel Plated.....₩ doz 6 50 @ 9 00
Gem.—No. 1 large, Japanned.....per doz $4·00
No. 2 medium.....per doz 3·50
No. 3 small.....per doz 3·00
In Gross Lots.....dis 10 %
Drawing Knives.
Crossman's No. 1.....dis 50&5&10 %
Douglass.....dis 60&10 %
Hart Mfg. Co., No. 1.....dis 60 %
Merrill.....dis 60&10 %
Bradley's.....dis 25 %
Adjustable Handle.....dis 15 %
Drills.
Ingersoll's Ratchet.....dis 25 %
Moore's Triple Acting Ratchet.....dis 20 %
Whitney's Ratchet.....dis 20 %
Blacksmiths'.....each $2 60 net
Breast, P. S. & W.....dis 15&10 %
" Miller's Falls.....dis 25 %
" Aiken's.....$2·50; 4·00, dis 40 %
Drill Chucks.—The Danbury..each 10·00, dis 25 @ 30 %
Egg Beaters.

Monroe's	8 in.	10 in.	
	Per doz $5·00	9·00	dis 10 %

Dover.....₩ doz net $6·00
National.....₩ doz $4·50—dis 20 %
Peerless.....₩ doz $4·00—dis 30 %
Emery.
Genuine Chester—Regular Nos.....₩ ℔ 7c } dis 10 %
" " Flour and FF.....₩ ℔ 4c }
Washington Mills—Regular Nos.....₩ ℔ 8c
" " Flour.....₩ ℔ 5c
Enameled and Tinned Ware.
Kettles.....dis 35 %
Sauce Pans.....dis 25 %
Glue Kettles.....dis 20 %
Tinned Saucepans.....dis 25 %
Escutcheons.
Brass Thread.....dis 60&10 %
Wood.....dis 25 %
Faucets.
Cork Lined, Wood.....dis 60&10 %
Fenn's.....dis 50 %
" Cork Stops.....dis 40 %
Star.....dis 55&10 %
Frary's Patent Petroleum.....dis 15&10 %
Taylor's Pattern " .....dis 20&10 %
Wood and Metallic.....dis 40 %
Feller Plates......₩ ℔ 14c; dis 10 %
Files.
American File Co.....$5 00 to £ currency—dis 10 %
Nicholson.....$5 00 to £ currency—dis 12½ %
Hartford File Co.....$5 50 to £ currency—dis 10 %
Newbould's.....$ 25 to £ gold
Rothery's.....$5 to £ currency
J. & Riley Carr.....$ 25 to £ gold
" " Horse Rasps.....$ 50 to £ gold
Stubs'.....$ 50 @ $ 00 to £ gold
Butcher's.....$ 25 to £ gold
Walter Spencer & Co.'s "Diamond".....$ 00 to £ gold
Spear & Jackson's.....$ 00 to £ gold
Jowitt's.....$ 25 to £ gold
"Western".....$ 00 to £ net
W. K. & C. Peace's "Imperial".....$ 25 to £ gold
R. Ibbotson.....$ 00 to £ gold
Fisher's.....$ 75 to £ gold
Goodlad's.....$ 00 to £ gold
Moss & Gamble.....$ 25 @ $ 50 to £ gold
Thos. Turner & Co. (Peter A. Frasse & Co.).....$ 00 to £ gold
" " " Horse Rasps.....$ 25 to £ gold
"Philo Sheffield," P. T. Co.....$ 00 to £ gold
Fluting Machines.
Mrs. Coles, 7 inch rolls.....6 50
" " 5 " 5 50
Knox, with 4-inch Rolls.....4 40 each net
" " 6 " .....5 25 each net
O. K.....6 50 each net
Peerless, 4-inch Rolls.....4 00 each net
" 5 " .....4 75 each net
Excelsior, No. 1.....4 75 each net
" No. 2.....6 50 each net
Diamond.....7 50 each net
Climax 7-inch Rolls.....8 00 each net
" 4½ " .....6 50 each net
Empire.....4 00 each net
Eureka. No. 1, 7-inch Roll.....8 00 each net
" No. 2, 5-inch Roll.....6 00 each net
K. F. M., 4½-inch Roll.....5 50 each dis 15 %
" 5-inch Roll.....6 00 each dis 15 %
Myers Fashion Fluter, 4½-inch Rolls.....8 00 each net
" Convex Brass Fluter, Sad Iron attachment..$1·75
Domestic Fluter.....$1·75 each net
Fairy, Self-Heater.....8 00 each net
Geneva Hand Fluter.....$15 00 per doz net
Champion, 6 inch rolls.....$6 00 each dis 10 %
" 4 inch rolls.....$5 00 each dis 10 %
Fluting Scissors......dis 25&10 %
Forges.
"Empire" (W. P. Kellogg & Co.).....dis 20 %
Forks.
Hay, Manure & Spading.....dis 30 %
Plated A 1.....dis 40, 10&5 %
Fry Pans.
Burnished, P. S. & W.....dis 30 %

₩ doz	$7·50	8·00	8·50	9·25	4·12	4·50	5·00	5·62	6·75
No.	0	1	2	3	4	5	6	7	8

Smith, Burns & Co., "Excelsior" Polished.....dis 35 %

₩ doz	$3·70	4·00	4·70	5·20	6·00	7·00	8·00	9·00
No.	1	2	3		5	6	7	8

Gas Stoves.
Tiffs & Howard.....dis 20 %
Gauges.
Marking.....dis 4½&10 %
Wire.....dis 10 %
Gimlets.—Metal and Wood Head.....dis 25&10 %
Grind Stones.—J. F. Green & Bro.....dis 20 %
Grind Stone Fixtures
Sargent's Patent.....dis 65&11 %
Reading Hardware Co.....dis 60&5&10 %
Hart Mfg. Co.'s.....dis 60&5&10 %
Hammers.
Emmet Hammer Co.'s Handled.....dis 25 %
" " Sledge & Stone..₩ ℔ 25 @ 30c net
Humason & Beckley Mfg. Co.....dis 16⅔&10 %
Maydole's, new list.....dis 5 %
Cheney's.....new list net
Verree.....dis 5 %
Yerks & Plumb.....dis 12½ %
Magnetic Tack.....dis 2 &10 %
Warner's.....list net
Hand Cuffs and Leg Irons.
Tower's.....dis 25 %
Providence Tool Co.'s Hand Cuffs $15 per doz } dis 10 %
" " Leg Irons.. 25 " }
Handles.
Wrought Chest.....dis 60&10 %
Surface Chest.....dis 65&10&10 %
Flush Chest.....dis 60&10 %
Lifting.....dis 60&10 %
Coffin.....dis 50&10 @ 60&10 %
Saw and Plane.....dis 20&10 %
Hammer and Hatchet.....dis 10 %
Greensboro', Axe, Pick, Hammer, &c.....dis 10 %
Woolworth Axe, Pick and Sledge.....dis 10 %
Brad Awl.....per gross $3 50—dis 10&10 %
Hickory Firmer Chisel, asst'd " 5 25—dis 10&10 %
" " " large " 6 25—dis 10&10 %
Apple " " asst'd " 6 00—dis 10&10 %
" " " large " 7 00—dis 10&10 %
Socket " " asst'd " 3 50—dis 10&10 %
" Framing " " " 6 00—dis 10&10 %
File " " " 3 50—dis 10&10 %
Auger " " " 5 50—dis 10&10 %
" " large " 6 50—dis 10&10 %
Hangers.
Barn Door.....dis 65&10 %
"Anti-Friction" (Hider, Wooster & Co.).....dis 50 %
Novelty.....dis 30 %
Harness Snaps.
Henshaw's.....dis 25&10 %
Judd's.....dis 40 %
Fitch's (Bristol).....dis 30 %
Hotchkiss'.....dis 10 %
Andrews'.....dis 25 %
Sargent's.....dis 50&10 %
New York Wire.....dis 2 &20 %
Hatchets.—Isaiah Blood.....dis 10 %

Shingling, Nos. 1 2 3	₩ doz	$7 50	8 00	8 50
Claw, " 1 2 3	₩ doz	8 50	9 00	9 50
Lathing, " 1 2 3	₩ doz	7 50	8 00	8 50

Hunt's.....dis 10 %

Shingling, Nos. 1 2 3	₩ doz	$7 25	8 00	8 75
Claw, " 1 2 3	₩ doz	7 75	8 50	9 25
Lathing, " 1 2 3	₩ doz	7 50	8 25	9 00

Hurd's.....dis 25 %

Shingling, Nos. 1 2 3	₩ doz	$8 00	8 50	9 00
Claw " 1 2 3	₩ doz	9 00	9 50	10 00
Lathing, " 1 2 3	₩ doz	8 00	8 50	9 00

Newark's Edge Tool Co.'s.....dis 25 %

Shingling, Nos. 1 2 3	₩ doz	$6 50	7 00	7 50
Claw, " 1 2 3	₩ doz	7 25	7 75	8 25
Lathing, " 1 2 3	₩ doz	6 50	7 00	7 50

Yerkes & Plumb.....dis 12½ %

Shingling, Nos. 1 2 3	₩ doz	$7 00	7 50	8 00
Claw, " 1 2 3	₩ doz	7 50	8 00	8 50
Lathing, " 1 2 3	₩ doz	7 00	7 50	8 00

Simmon's.....dis 15 %

Shingling, Nos. 0 1 2 3	₩ doz	$7 50	8 00	8 50	9 00
Claw, " 1 2 3	₩ doz		9 00	9 50	10 00
Lathing, " 1 2 3	₩ doz		8 00	8 50	9 00
Broad, " 1 2 3	₩ doz		9 00	10 00	12 00
" " 4 5 6	₩ doz		14 00	16 00	18 00
" " 7 8	₩ doz		20 00	22 00	

Elephant.....dis 25 %

Shingling, Nos. 1 2 3	₩ doz	$8 00	8 50	9 00
Claw, " 1 2 3	₩ doz	9 00	9 50	10 00
Lathing, " 1 2 3	₩ doz	8 00	8 50	9 00

J. P. Verree & Co.....dis 5 %

Shingling, Nos. 1 2 3	₩ doz	$7 00	7 50	8 00
Claw, " 1 2 3	₩ doz	7 50	8 00	8 50
Lathing, " 1 2 3	₩ doz	7 00	7 50	8 00

Underhill's.....dis 10 %

Shingling, Nos. 1 2 3	₩ doz	7 25	8 00	8 75
Claw " 1 2 3	₩ doz	7 75	8 50	9 25
Lathing, " 1 2 3	₩ doz	12 00	11 00	18 00

Hinges.
Gate, Western.....₩ doz $6·25—dis 60&10 %
" N. E.....₩ doz 11·25—dis 6 &10&10 %
" N. Y. State.....₩ doz 7·50—dis 60&10 %
Rolled Plate.....dis 65&10 %
" Raised.....dis 55&10 %
Wrought Strap and T.....dis 35&10 %
Providence Plate. { 6 and 8 in. 11c ₩ ℔ / over 8 in. 9½c ₩ ℔ } dis 25 @ 30 %
Screw Hook and Strap.....{ ⅝, ¾, 1, 1¼ in. 7c / 1½ to 3 in. 6c } net
Heavy Welded Hook.....{ ⅜ to 1 in., 6½c / 1¼ in. & up, 6c } net
Screw Hook and Eye.....{ ⅜ to 1 in., 6½c / ½ in. 7½c / ⅝ in. 9c } net
Hoes.
Solid Shank, C. S.....₩ doz $8 00—dis 30 %
Socket.....₩ doz 9 00—dis 30 %
Riveted Eye.....₩ doz 5 00—dis 30 %
Grub.....dis 25 %
Planters'—Winsted.....add 10 %
Scovill.....add 33⅓ %
Scovill Pattern (Winsted).....add 30 %
Lane's C. S. Cresent, American Pattern.....add 5 %
" " " Scovil Pattern.....add 15 %
Hooks.
Harness.....dis 60 10&5 %
" .....dis 70&10 %
Bird Cage.....dis 50 %
Cotton.....dis 50&10 %
Belt.....dis 50&10 %
Clothes Line.....dis 60&30&10 %
Bench—Skinner's.....per doz $8 00, dis 30&10 %
Bench—Hotchkiss' $5 00 ₩ doz.....dis 10 %
Bench—Weston's No. 1, $8·00; No. 2, $7·00 per doz net
" —McGill's.....$8 00 per doz, dis 10 %
Wardrobe, Japanned.....new list dis 60, 10&5 %
Hat and Coat " .....new list dis 60, 10&5 %
Wrought Staples and Hooks and Staples.....dis 70&10 %
Screw Hooks and Eyes.....dis 70, 10&10 %
Grass.....dis 2 %
Whiffletree—Patent.....dis 30 %
Hooks and Eyes—Malleable Iron.....dis 60&10&10 %
" " Brass.....dis 60&10&10 %
Horse Nails.
Putnam's.

No.	5	6	7	8	9	10
	32c	28c	26c	25c	24c	22c

In lots 200 lbs. dis. 5 %.
Ausable Horse Nail Co.

No.	5	6	7	8	9	10
Ausable	30c	27c	25c	24c	24c	22c
Pointed and Polished.	31c	28c	25c	25c	24c	23c
Pointed and Blued..	32c	29c	27c	26c	25c	24c

In lots of 1000 lbs., 5% discount.
Brundage.

No.	5	6	7	8	9	10
	29c	26c	24c	23c	22c	21c

In lots of 500 lbs., dis. 5 %.
American Pressed.

No.	5	6	7	8		10
	22c	20c	20c	20c	20c	20c

In lots of 1000 lbs. dis 5 %.
Perkins Finished (ready to drive).

No.	5	6	7	8	9	
	31c	28c	26c	25c	24c	

In lots of 1000 lbs. dis 5 %.
Buffalo Forged.

No.	5	6	7	8	9	10
	28c	26c	25c	24c	23c	

Globe (Pointed and Polished).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs., 5 % discount.
National (Pointed and Polished).

No.	5	6	7	8	9	10
Patent Finish	23	25	28	24	21	20
Extra "	30	27	25	24	23	24

In lots of 1000 lbs., dis 5 %.
Vulcan (Blued, pointed, ready to drive).

No.	5	6	7	8	9	10
	33c	30c	28c	27c	26c	25c

In lots of 500 lbs., 5 % discount.
" 1000 lbs 7½ % discount.
New London Horse Nails.

No.	5	6	7	8	9	10
Great Western	27c	25c	24c	23c	22c	
U B	29c	27c	26c	25c	24c	

In lots of 1000 lbs., dis 5 %.
Star Brand.....₩ ℔ 16c
Morgan.....14c
Horse Shoes.
Burden.....₩ keg, $5 85
R. I. Horse Shoe Co., Perkins Pattern.....₩ keg, 5 85
" " R. I. Pattern.....₩ keg, 6 35
Mule Shoes.....₩ keg, 6 85
Kettles.
Brass.....₩ ℔ 55c net
In lots of 500 lbs.....₩ ℔ 50c net
Knives.
Ames' Butcher Knives.....dis 20 %
" Shoe " .....dis 15 %
" Bread " .....₩ doz $1·50—dis 15 %
Hay and Straw. " Wadsworth's".....dis 20 %
Lothrop's Cocoa Handle Lap Bolster Butcher Knives.....dis 25 %
Knobs.
Carriage.....dis 60&10 %
Base—Common.....net
" Plush Tip.....dis 10 %
" Elastic End, No. 8.....dis 30&10 %
Ladles.
Melting.....dis 20 %
Lanterns.
Peerless.....No. 5, per doz $11·75—dis 10&10 %
Brady's Patent.....dis 10 & 10 %
Etna.....dis 10 & 10 %
Yankee.....dis 10 & 10 %
De Beque.....dis 10 & 10 %
Lard Presses.
Draw Cut, 14 inch.....each $65 00—dis 20 %
Lemon Squeezers.
Porcelain Lined.....per doz $7 00, dis 10 %

Lines.
Linen Fish.....dis 10&10 %
Cotton Chalk.....dis 40 %
Silver Lake Chalk.....dis 10&10 %
Mason's.....dis 10&10 %
Galvanized Wire Clothes.....$1 per 100 ft. dis 33⅓ %

Locks and Latches.
Cabinet—Gaylord.....dis 25 %
" Eagle.....dis 25 %
Trunk " .....new list dis 25 %
Langstroth & Crane, Round Key.....dis 40 %
" " Flat Key.....dis 33⅓ %
Barnes & Deltz.....dis 25 %
Continental.....dis 15 %
Shepardson's.....dis 20 %
Romer's Padlocks.....dis 15 %
Scandinavian Jail.....dis 10 %
American Lock Co.....dis 33⅓ %
Plate.....dis 25 %
Pad.....dis 50&5, and 2 % for cash
Yale Lock Co.....dis 40 %
Sargent & Greenleaf.....dis 20 %
Trentou.....
Brunford.....
Norwich.....
Russell & Erwin.....dis 45&5 %.
Norwalk.....2 % extra for cash.
Nashua.....
Mallory, Wheeler & Co.....
P. & F. Corbin.....
Parker & Whipple.....
Jacobus & Nimick Mfg. Co.....

Mallets.
Hickory and Lignumvitæ.....dis 20 %
Meat Cutters.
Dixon's (P. S. & W.).....dis 10 %

No.	1	2	3	4
₩ doz.	$14 00	$17 00	$19 00	$20 00

Hales'.....dis 25 %

No.	11	12	13
₩ doz	$47 00	$33 00	$42 00

Miles Challenge.....dis 20 %

No.	1	2	3
₩ doz.	$32·00	$30·00	$40 00

Perry's Champion (P. S. & W.).....dis 10 %

No.	200	300	400
₩ doz.	$22 00	$27 00	$40 00

Woodruff's (P. S. & W.).....dis 10 %

No.	100	150	
₩ doz.	$15 00	$18 00	

American.....dis 25 @ 25&5 %

No.	1	2	2½	3	4	B	5
Each	$6·00	$9·00	$12·00	$15·00	$30·00	$60·00	$75·00

Dura Cut.....dis 20 %

No.	5	6	8
Each	$56·00	$90·00	$250 00

Molasses Gates.
Stebbins'.....dis 65&10 %
" Tinned ends.....dis 40&10 %
Bush's.....dis 30 %
Lincoln's.....dis 50 %
Weed's.....dis 15 %
Mortars and Pestles.
Iron.....net
Nails......See Trade Report
Nail Pullers.
Capewell's Giant.....per doz $30 00 net
Nuts and Washers.
Nuts.....large, 6c; small, 8c off list.
Washers.....large, 8c; small, 10c off list.
Oil Stones.
Washita No. 1.....₩ ℔ 22c
W ita Slips.....₩ ℔ 45c
Washita No. 2.....₩ ℔ 17c
Arkansas.....₩ ℔ 1 25
Hindostan.....₩ ℔ 6c dis 40&10 %
" Slips.....₩ ℔ 10c dis 10&10 %
Sand Stone.....6c—dis 10&10 %
Oilers.
Miller's Zinc.....dis 40 %
" Brass and Copper.....dis 25 %
Olmsted's.....new list dis 25&10 %
Broughton's.....dis 25&5 %
Malleable.....per doz $5 00 dis 10 %
Common Tin.....dis 30&10 %
" Zinc.....dis 30&10 %
" Brass and Copper.....dis 30&10 %
Prior's Patent or "Paragon".

Trenton Parallel	dis 15 %
Merrill's Parallel	dis 15 %
Parker's	dis 20 %
Stephens' Parallel	dis 15 ct 20 %
Bonney's Saw Filers	per doz $30—dis 25 %
Stearn's Saw Filers	per doz $20—dis 25 %

Wheel Barrows.

Canal (Pugsley & Chapman)	new list dis 10 %
Coal, Garden and Stone (Pugsley & Chapman)	dis 25 %

Wheel Heads.

Brass Bushed	per doz $3 50 net

Well Wheels.

Revised list	dis 60&10 %

Wire.

Brass and Copper	dis 10 %
Bright and Annealed	Nos. 9 @ 18 dis 40 @ 45 %
" "	" 19 @ 26 dis 50 @ 55 %
" "	" 27 @ 36 dis 55 @ 60 %
Coppered	" 0 @ 18 dis 35 @ 40 %
Galvanized, Nos. 0 to 6	market list net @ dis 5 %
Galvanized, Nos. 7 to 18	market list dis 10 @ 15 %
Tinned	dis 25 @ 30 %
Cast Steel	15 @ 20 %
Tinned Broom Wire	dis 80 @ 85 %
Galvanized Telegraph, Nos. 8 and 9	℔ ℔ 9c @ 10c
Galvanized Telegraph, Nos. 10 and 11	℔ ℔ 10½c @ 11½c
" " 12	℔ ℔ 10½c @ 11½c
Annealed Fence, Nos. 8 and 9	dis 45 @ 45 %
" Grape, " 10 to 14	dis 40 @ 45 %
Fence Staples	℔ ℔ 8 @ 8½ %
Stubs' Steel Wire	$7 00 to £ gold
Judd's Picture Wire	dis 50

Wrenches.

American Adjustable	dis 45 %
Baxter's Adjustable "S"	dis 30 %
" Diagonal	dis 30 %
Collins & Co.'s	dis 45 %
Coes' Genuine	dis 40&5 %
" Pattern (Wrought)	dis 50&10 %
" " (Malleable)	dis 60&10 %
Lindsay's Patent	dis 25 %
Taft's Pattern	dis 20 %
Davis' Patent Duplex	new list dis 25 %
Bemis & Call's Patent Combination	dis 20&5 %

Wringers.

Providence	℔ doz $63 00
Reliance	℔ doz 57 00
Universal—Extra	℔ doz 60 00
Novelty	℔ doz 60 00
Sherman	℔ doz 57 00
Monitor	℔ doz 57 00
King	℔ doz 60 00
Crown	℔ doz 60 00
Eureka	℔ doz 60 00
Independent	℔ doz 57 00

TIN WARE AND TRIMMINGS.

STAMPED TIN WARE, dis 10 %.
COMMON STAMPED WARE, &C.

Bucket Covers.

Quarts	½	1	2	3	4
Inch	4½	5 3-16	6 5-16	6½	7 11-16
P r gross	$2 00	2 60	3 40	4 25	5 75
Quarts	6	8	10	12	
Inch	8½	9½	9½	10 9-16	
Per gross	$7 00	8 00	8 50	11 50	

Cake Box Covers.

	Small.	Medium.	Large.
Inch	11½	12½	13½
Per gross	$15 00	18 00	22 00

Pot Covers.

Inch	7½	8¼	8½	9¼	9½	10¼
Per gross	$5 75	6 00	6 25	6 75	7 25	8 25
Inch	10½	11¼	11½	12¼	12½	13¼
Per gross	$8 75	9 50	10 00	13 00	13 75	16 50

Pie, Dinner or Scolloped Plates.

Inch	6	7	8	9	10	11
Per gross	$4 00	5 00	6 00	6 50	8 50	10 50

Deep Pie Plates.

Inch	9	10
Per gross	$8 50	10 50

Jelly Cake Pans.

Inch	9	10
Per gross	$7 50	10 00

Coffee Pot Covers.

Plain	1½	2	3	4	5	6 qts.
Inch	3	3½	3¾	4½	5	
P r gross	$1 15	1 40	1 60	2 00	2 75	3 00
Rimmed	2¾	3	3¼	4	4½ inches.	
Per gross	$2 25	2 50	3 00	3 50	4 00	

T. K. Breasts only.

Inch	7½	8	8½	9	9½	10	10½	11	11½
Per gro.	$6 00	6 50	6 75	7 25	7 75	9 00	10 00	12 00	13 00

Grater Plates.

Sheet	¼	1
Per gross	$3 00	11 50

Scolloped Cake Pans.

	Small.	Large.
Without Tubes	per gross, $8 00	11 50
With Tubes	" 10 50	14 00

Stamped Square Pans.

No	¼
Per gross	$7 50 14 50

Common Square Pans (One Sheet).

Per gross	$12 50

Milk Skimmers (Plain or Pierced).

Per gross	$4 00

Lettered Plates.

Inch	5½ 6
Per gross	$3 25 4 00

Steamer Bottoms.

Add $1 per gross, or 10c. per doz. to list of Pot Covers.

Tin Stove Pipe Rings.

Inch	4	4½	5	5½	6	7
Plain	per gro. $4 50	5 00	5 50	6 00	6 50	7 50
Jap'd or Burn'd	6 00	6 50	7 00	8 00	8 50	10 00

Coffee Boiler Lips.

	Small.	Large.
To Rivet	per gross, $0 85	1 10
To Solder	" 1 25	

Plain Stamped Water Dippers,

	½ pint.	Pint.	Quart.	2 quarts.	3½ quarts.
Per doz	90	1 15	1 50	1 85	2 50

RETINNED WARE, dis 25 %.

Retinned Milk Pans.

Qts.	½	1	1½	2	3½	4	5	6	8	10	12
℔ doz.	1 20	1 50	1 75	2 00	2 25	2 75	3 15	3 50	3 85	4 75	5 25	3 75

Dipper Bowls, Plain Stamped dis 20 @ 25 %

Pints	½	1	Quarts	1	2	2½
Per doz.	60	75	Per doz	1 00	1 25	1 75

Dipper Bowls, Retinned dis 20 @ 25 %

Pints	½	1	Quarts	1	2	2½
Per doz.	75	90	1 05	Per doz	1 40	1 75 2 25

Pans.

Dish Pans, Tinned dis 20 @ 25 %

Quarts	7	8	10	14	17	21 30
Per doz	5 50	6 00	6 50	8 00	10 00	13 00

JAPANNED TIN WARE.

Canisters, Common dis 10 %

Pound	½	1	2	3
Per doz	$1 10	1 60	2 50	3 25

Canisters, Hinged dis 10 %

Pound	1	2
Per doz	$1 75	2 75 3 40 3 75 4 50

Candlesticks, Japanned dis 10 %

No	1	2
Per gross	$5 00	7 00

Cake Pans, Round, per nest, $3 25, dis 10 %

" Sqnar per nest, 4 25, dis 10 %

Chamber Pails, Japanned (Smith, Burns & Co.) dis 10 %

Nos	2	3	4	5
Green, per doz	$8 00	9 00	10 50	12 00
Oak	9 50	10 50	12 00	13 50

Dust Pans, Corrugated, per gross, $22 00, dis 10 %

Box Graters, per gross, $4 00, dis 10 %

Molasses Cups dis 10 %

Pint	½	1
Per doz	$1 25	50 9 75

Lunch Boxes, per doz 7 in $2 00; 8 in. $2 50; dis 10 %

Pepper Boxes Japanned dis 10 %

Per gross Small, $3 00; Large, $4 00

Toy Banks, House dis 0 %

Tea Trays, American Tea Tray Co dis 15 %

No	1	2
Per gross	$7 00	9 00

Toy Banks Gothic dis 10 %

No	1			
Per gross	$5 50			
Toy Cups, Straight dis 10 %				
No	1	2	3	
Per gross	$4 00	3 50	3 50	
Toy Guns, Flaring No. 1, $4 25; 2, $3 75 ℔ gross, dis 10 %				
Toy Pails, Covered dis 10 %				
No				1
Per gross				$4 50
Toy Rattles per gross, $2 25, dis 10 %				
Trunks, Wire Handled per nest (5) $1 30, dis 10 %				
Spittoons, Tin per gross, No. 2, $30, No. 3, $25, dis 10 %				

PLANISHED TIN WARE.

Planished Coffee Pots, Round dis 25 @ 30 %								
Each	60	75	85	95	1 15	1 25	1 30	1 40
Pints	1	2	3	4	5	6	7	8
Planished Tea Pots, Round dis 25 @ 30 %								
Each		70	80	90	1 05	1 15	1 25	
Pints		2	3	4	5	6		
Planished Tea Pots, Oval dis 25 @ 30 %								
Each		70	80	90	1 05	1 15	1 40	1 75
Pints		2	3	4	5	6		
Planished Pepper Boxes, No. 1 per doz, $1 52								
Planished Flour Dredges, No. 3, $2 10; 4, 2 45 ℔ dozen.								
Planished Round Coffee Biggins dis 25 %								
Pints	2	3	4	5	6	8		
Each	$1 00	1 10	1 20	1 40	1 60	2 00		
Planished Oval Coffee Biggins dis 25 %								
Pints	2	3	4	5	6	8		
Each	$1 15	1 25	1 40	1 60	1 80	2 25		
Planished Oval Chafing Dishes, Imperial Covers dis 25 %								
Inch	10	12	14	16	18	20	22	24
Each	$3 85	5 00	6 25	7 60	9 00	11 50	13 00	16 50
Planished Oval Chafing Dishes, Low Covers dis 25 %								
Inch	10	12	14	16	18	20		
Each	$3 25	4 35	5 20	6 20	7 30	9 25		
Planished Low Dish Covers dis 25 %								
Inch	10	11	12	14	16	18	20	
Each	$ 70	80	1 00	1 20	1 40	2 00	2 75	
Planished Imperial Dish Covers dis 25 %								
Inch	10	11	12	14	16	18	20	22 24
Each	$1 55	1 70	2 00	2 60	3 15	3 45	4 60	5 45 6 30
Planished Etnas, on Stands dis 25 %								
Pints	1½	2	3	3	3	4	5	
Each	$0 90	1 00	1 20	1 40	1 60	1 75		
Planished Liquor Mixers dis 25 %								
Nos	0	1	2					
Per doz	$2 00	2 10	2 45					
Planished Oval Melon Molds dis 25 %								
Nos	2	3	4	5	6	7	8	9
Each	$0 60	65	70	80	90	1 00	1 15	1 25
Planished Oval Tumbler Warmers dis 25 %								
To fit 1, 2, 3, and 4 O. G. Urns each, $2 50								
Planished Oval O. G. Urns dis 25%								
Nos	0	1	2	3	4	5	6	7 8
Each	$4 90	5 45	6 30	7 00	7 75	9 25	11 25	12 50 15 50
Planished Round Urns dis 25 %								
Nos	0	1	2	3	4	5	6	7
Each	$4 20	4 85	5 45	6 20	7 75	9 00	11 00	14 25
Planished Round Oyster Dishes, (Complete) dis 25 %								
Nos							1	2
Each							$2 10	2 80
Planished Oyster Dish Plates dis 25 %								
Nos							1	2
Each							$0 25	0 30
Oyster Dish Covers dis 25 %								
Nos							1	2
Each							$0 30	0 35

Tea Pot Handles—P. S. & W. dis 20 %

Stow's Patent Hollow Tea Pot Handles.

No. 1, Small 4½ inches	per gross, $11 50
No. 2, Medium, 5⅜ "	" 12 50
No. 3, Large, 6¼ "	" 13 50
No. 4, Ex. Large 7¼ in., for Wash Pitchers &c.	" 18 00

Stow's Patent. New Pattern.

No. 25, Small, 4½ inches	per gross, $11 50
No. 35, Medium, 5⅜ "	" 12 00
No. 45, Large, 6¼ "	" 13 00

Solid Iron. Tin Tipped.

No. 10, Small, 4⅜ inches	per gross, $9 00
No. 15, Medium, 5⅛ "	" 9 50
No. 20, Large, 6⅛ "	" 10 75

Stow's Patent Hollow Tea Pot Handles, Adamantine Bronze—P. S. & W.

No. 12. Bronzed and Tin-Tipped per gross, $13 50

Saucepan Handles. Of Best Malleable Iron.

P. S. & W. dis 20 %

Japanned.

No. 1, 5½ inches long	per gross,	$2 50
No. 2, 6 "	"	3 75
No. 3, 6½ "	"	4 00
No. 4, 7¼ "	"	4 25
No. 5, 8 "	"	4 50
No. 6, 9 "	"	4 75

Tinned.

No. 1, 5½ inches long	per gross,	$4 25
No. 2, 6 "	"	4 50
No. 3, 6½ "	"	4 75
No. 4, 7¼ "	"	5 25
No. 5, 8 "	"	5 50
No. 6, 9 "	"	5 75
Japanned	per lb.,	16
Tinned	"	20

Iron Kettle Ears (P., S. & W.) dis 45 %

Half gross pairs in a package.

Tinned.

Nos	1	2	3	4	5	6	7	8
Per gross pairs	88c	$1 00	1 50	1 75	2 10	2 75	3 50	4 75

Black.

Nos	1	2	3	4	5	6	7	8
Per gross pairs	75c	88c	$1 35	1 50	1 75	2 25	2 75	4 00

Tinned Tea Kettle.

Nos	4	5	6
Per gross pairs	$1 75	2 10	2 75

Extra Heavy Tinned Kettle Ears—French Pattern.

Nos	1	2	3	4	5	6	7
Per gross pairs	$1 00	1 25	1 50	1 75	2 25	2 75	3 50

Malleable Iron Kettle Ears for Coal Hods, &c.

P. S. & W. dis 20 %

No. 10 Small	℔ lb., Tinned, 30c; Black, 16c
No. 20 Medium	℔ lb., " 20c; " 16c
No. 30 Large	℔ lb., " 20c; " 16c
No. 40 Extra Large	℔ lb., " 20c; " 16c

In cases of 100 lbs. each.

Milk Can or Boiler Handles—(P. S. & W.) 4½ in..dis 25

Plain, 8c.; Japn'd, 9c.; Tinned, 16c. per lb.; Malleable Clips or Ears to match, Tinned 30c per lb.

Toilet Ware Handles—4½ inches (P. S. & W.) dis 35 %

Plain with drilled holes, per lb	9c
Plain with Cast " "	8c

Plumbers' Scrapers—(P. S. & W.) dis 25 %

Extra quality, length 6 in., per doz $4 00

METALS.

IRON.—DUTY: Bars, 1 to 1¼ cents per lb., Sheet, Band, Hoop and Scroll, 1¼ to 1½ cents per lb. Provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 per ton; Polished Sheets, 2 cents per lb.; Wrought Scrap, $8 per ton; Cast Scrap, $6 per ton. All subject to a reduction of 10 per cent. Railroad, 70 cents per 100 lbs. Boiler and Plate, 1½ cents per lb.

Pig Iron—AMERICAN.

Foundry No. 1	℔ ton,	$25 00 @ 26 00
Foundry No. 2	"	23 00 @ 24 00
Gray Forge	"	20 00 @ 23 00
White and Mottled	"	

SCOTCH.

Coltness	"	40 00 @ 41 00
Glengarnock	"	37 00 @ 38 00
Eglinton	"	35 00 @ 37 00
Summerlee	"	

Bar Iron.

Ain. Rennied, at mill	nominal	℔ ℔

Rails.

Welsh, gold	℔ ton,	47 00 @ 50 00
American, at works, currency	"	48 00 @ 53 00
Old Rails, currency	"	28 50 @ 30 00

Scrap.

Wrought Scrap	"	28 00 @ 30 00

Bar Iron from Store.

Common Iron.

⅜ to 2 in. round and square	℔ ton,	$62 50
⅜x9-16 in " "	"	67 50
½ in. " "	"	70 00
2½ to 3 in. "	"	67 50
1 to 6 in. wide x ⅜ and 1 in thick	"	62 50
1¼ to 6 in wide x ½ & 5-16 in. thick	"	67 50
1 and 1¼ in. x ⅜ and 5-16	"	70 00

Swedish Iron.

1½x⅜ to ⅝	"	137 50
1¼ to 5x1¼ to ⅝ and ⅜ to 1½ in. square	"	132 50
6 to 7x⅜ and ⅝	"	142 5

Rennea Iron.

⅜ to 2 in. round and square	"	65 00
1 to 6 in. wide x ½ to 1 thick	"	65 00
1¼ to 6 in wide x ½ and 5-16 thick	"	70 00
1 and 1¼ x ½ and 5-16	"	70 00

Large Rounds.

2¾ to 2¾ round and square	"	75 00
3, 3¼ and 3½ in	"	80 00
3¾ and 4 in	"	87 50
Rods—⅜ and 11-16, round and square	"	67 50
½ and 9-16, " "	"	70 00
7-16, " "	"	77 50
⅝, " "	"	82 50
5-16, " "	"	87 50
¾, " "	"	92 50
⅞-16, " "	"	125 00

Sheet Iron.

	Common American and English.	R. G. American.	R. G. English.
Nos. 10 to 30	℔ ℔ 4½ @ 4¾c	5½c	5½c
21 to 24	" 4¾ @ 5c	6c	6c
25 to 26	" 5c	6c	6c
27	" 5¼c	6c "	6¼c
28	" 5¼c	6c	6¼c

Galvanized, 1 to 20 prime, ℔ ℔ 10; 2d quality ℔ ℔ 9c

"	21 to 24	" " 11	" 10c
"	25 to 26	" " 12	" 11c
"	27	" " 13	" 12c
"	28	" " 14	" 13c

Patent Polished	℔ ℔ 15c
Russia, Nos. 8 to 28	" 17c
" Stained, No. 1	" 16c
Belgian	" 13c

One piece Corrugated Sheet Iron Elbows.

CHARCOAL IRON

¾	5	5¼	6	7	inch.
$3 50	3 50	4 00	5 25	6 50	per doz.

RUSSIA IRON.

4½	5	5½	6	7 inch.
$5 00	7 00	9 50	12 00	14 00 per doz.

BABBITT METAL.

N. P. U	℔ ℔ 8½ @ 9c

COPPER DUTY: Pig, Bar and Ingot, 5c.; old copper, 4 cents ℔ ℔; Manufactured (including all articles of which copper is a component of chief value) 45 % ad valorem. All subject to a reduction of 10 per cent.

American Ingot	℔ ℔ 25½ @ 34c
English	"

SHEATHING, BRAZIERS COPPER, BOLTS, &C.

Braziers Copper, ordinary sizes, over 16 oz., per square foot	33c	℔ ℔
Braziers' Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot	35c	"
Braziers Copper, 12 oz. per square foot and lighter	39c	"
Circles less than 84 inch in diameter	35c	℔ ℔
Circles, 84 inch diameter and over	39c	"
Segment and Pattern Sheets	35c	"
Locomotive Fire Box Sheets	38c	"
Sheathing Copper, over 12 oz. per sq. ft.	31c	"
12 oz. ℔ sq. ft. and lighter	39c	"
Bolt Copper	33c	"
Copper Bottoms 32 c. ℔ ℔		net

No Copper in Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

O'NEILL'S PATENT PLANISHED COPPER.

14x48.

14 and 16 oz. and heavier	36c. By the case,	c. ℔ ℔
12 oz. and lighter	30c. " "	32c. "

Cooler Sizes.

7 in., 14x52, 8 in., 14x56, 9 in., 14x60

14 and 16 oz. and heavier 36c. By the case, 37c. ℔ ℔

(And all sizes not over 30 inches wide.)

30x60

14 and 16 oz. and heavier	40c. ℔ ℔
12 oz.	43c. "

TINNING.

14x48, by the case	8c. ℔ sheet
14x48, less than case	10c. "
Cooler Sizes, 7 and 8 inch	12c. "
" 9 inch	15c. "
Other sizes not larger than 30x60	3½c. ℔ sq.
Larger than 30x60	5c. "

LEAD—DUTY Pig $4 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2½ cents per lb. All subject to a reduction of 10 per cent.

Spanish	6¾ @ 7c gold
German Refined	6½ @ 6¾c gold
English	6½ @ 7c gold
American	6¾ to 6¾c gold
Bar	dis 10 % 8¾c.
Pipe	dis 10 % 8¾c.
Tin Lined Pipe	dis 10 % 16½ c.
Sheet	dis 10 % 8¾c.
Shot	dis 10 % Drop, 8¾c.; Buck. 9¼c.

SOLDER No. 1. 15c; No. 2. 13¾ @ 14c

STEEL—DUTY: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2½ cents; over 7 cents, and not above 11, 3 cents per lb.; over 11, 3½ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. All subject to a reduction of 10 per cent. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as Steel.

American Cast Steel.

Tool	15 @ 16c
Spring	10c
Homogeneous	12½c
Tire	12½ @ 13½c
Machinery (round and square)	10 @ 11c
File	11c
Sheet	14 @ 16c
Saw Plate, mill and mulay	14 @ 16½c
Saw Plate, gang and X cut	13 @ 14c
" circular as to size	18 @ 30c

Chrome Steel.

Tool	℔ ℔ 20 @ 21c
Tool, extra fine	" 40 @ 75c
Spring	℔ ℔ 13c and upward
Machinery	℔ ℔ 14c.
Hammer	" 15c,
Gun or Homogeneous	" 16c

English Steel,—payable in gold, dis 5 % cash.

"	Best Cast	℔ ℔ 18c
"	Extra Cast	" 19c
"	Round Machinery, Cast	" 11½c
"	Swaged, Cast	" 16c
"	Best Double Shear	" 18c
"	Blister, 1st quality	" 13½c
"	" 2d quality	" 11½c
"	" 3d quality	" 10½c
German Steel, Best		" 11½c
do	2d quality	" 10½c
Sheet Cast Steel, 1st quality		" 18c
" "	2d quality	" 16c
" "	3d quality	" 14c
File Steel, Flat and ½ Round		" 12½c
"	Square and Round	" 13c
"	Mill	" 13½c
"	Taper to 4 inch	" 17c
"	Taper 3 and 3½ inch	" 18c

SPELTER—DUTY: In Pigs, Bars and Plates, $1 50 per 100 lbs.—less 10 per cent.

Silesian, cash	6¾ @ 7c., gold
American "	6¾ @ 11c., currency

TIN—DUTY: Plates, Sheets, Tagger and Terne, 15 per cent. ad val.; Electro-galvanized Plates, 2 cents per ℔; Manufactures of, not enumerated, 35 per cent. ad val.—all subject to a reduction of 10 per cent. Bars, Block and Pigs, free. Banca, subject to duty of 10 per cent.

Banca	℔ ℔ 26½ @ 27c., gold
Straits	℔ ℔ 22¼ @ 22⅝c., gold
English	℔ ℔ 22 @ 22½c., gold

CHARCOAL TIN PLATE.

I C 10x14, Prime Charcoal		10 75 to 11 00
12x12,	"	11 50
14x20,	"	11 75
I X 10x14,	"	13 25
12x12,	"	13 75
14x20,	"	14 25
D C 12½x17	"	10 00
D X 12½x17	"	12 75
For each additional X add		2 25

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary.
I C 10x14	$10 25 @ 10 75	9 50 @ 10 00	9 00 @ 9 50
I C 12x12	10 75	10 50	
I C 14x20	11 25	10 50	

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$10 00	9 25 @ 9 75	7 75 @ 8 50
I X 14x20	12 25		
I C 20x28	20 00 @ 21 00	19 00 @ 19 75	16 50 @ 18 00
I X 20x28	26 00		
I C 20x100 ft.	24 00		

ZINC—DUTY: Pig or Block, $1 50 per 100 lbs. Sheet 2¼c. ℔ lb. All subject to a reduction of 10 per cent.

Sheet	cask 9¼c
"	open 10c

Paper Stock, Old Metals, &c

(Dealers' Selling Prices.)

Canvas linen	6¼ @
" cotton, No. 1	6¾ @ 7
" " No. 2	@ 5
White linen rags, No. 1	6 @ 6½
" " No. 2	4¾ @
Colored	2½ @
Mixed woolens	@ 2½
Soft woolens	@ 5½
Gunny bagging	1¾ @ 2
Jute Butts	2¼ @ 2½
Kentucky bagging	5¾ @ 5¾
Book stock	4 @ 4½
Waste paper and scraps	1 @ 1¼
Rope cuttings	1¾ @ 3
Kentucky Bale rope	4 @ 4½
Oakum junk, No. 1	5½ @ 5¾
" No. 2	@ 4
Grass rope	3 @ 3½
Tarred Shaking	1½ @
White Colar Cuttings, all paper	4 @
" " muslin lined	3 @
" Envelope "	7 @
Hard White Shavings, No. 1	6¾ @
Soft " No. 1	6 @
White Shavings, No. 2	5¾ @ 6
Mixed Shavings, part white	4 @ 4¾
Imperfections, No. 2, best folded sheets	5 @
" " 1, Heavy Stock	4¾ @
Book Stock, Mixed	3¾ @
" " No. 2, light	2 @ ¾
Prints	1½ @ 2
Pure Manillas	2
Bogus Manillas and Hardwares	1 @ 1¾
Commons	1 @
Binders' Board Cuttings	1¾ @ 2
Straw Board Cuttings	1¾ @ 1¾

Old Metal.

Copper	@ 23
Yellow metal	14 @ 15
Brass	13 @ 14
Heavy Composition	11 @ 13
Old lead, solid	6 @ 6¾
Tea lead	4½
Wrought iron	1½ @ 1¾
Sheet iron	0¾ @
Cast iron	1 @ 1¼
Machinery iron	1¾ @
Zinc	
Pewter, No. 1	17
" No. 2	10 @ 12
Spelter	5½ @ 6

Paints, Oils, etc.

Paints.

Black, lamp—Coach Painters	℔ ℔ 20c
" " Ordinary	6c
" Ivory Drop, fair	15c
" " best	20c
Black Paint, in oil kegs, 8c.; asst'd cans, 11	c
Blue, Prussian, fair to best	50 @ 75c
" " in oil	35 @ 65c
" Chinese, dry	33c
" Ultramarine	25 @ 30c
Brown, Spanish	1¼c
" Van Dyke	9c
Carmine, 40	$12 00
Green, Chrome	15 @ 25c
" " in oil	18 @ 25c
" Paris good, 30c: best, 40c	
" " in oil " 30c " 45c	
Mineral Paints	1¾ @ 4c
Orange Mineral	14½c
Red Lead, American	9¼c
" " English	10¾c
" Venetian (N. C.) dry	2¾c
" " in oil asst'd cans, 11c; kegs, 8½c	
" Indian, dry	10c
Rose Pink	13c
Sienna, American, Raw	4c
" Burnt	11c
" " in oil	16 @ 20c
" Raw	15 @ 25c
Umber, Burnt	4 @ 8c
" " in oil	16 @ 21c
" Raw	3½ @ 7½c
" " in oil	16 @ 22c
Vermillion, Chinese	
" English	1 9c
" Trieste	1 6c
" American, Common	25c
White Lead, American, pure dry	10¾c
" " " in oil	11½c
White, Paris, English, prime in bbls.	2½ @ 2¾c
Yellow Ochre, French	2¾ @ 2¾c
" " in oil asst'd cans, 11c; kegs, 8½c	
" Vermont in casks	1½c
" Chrome	17 @ 21c
" " in oil	18 @ 22c
Zinc White, American No. 1 dry	9c
" " 1, in oil	11c
" French (Paris)	11 c
" " in oil	12 c

Oils.

Linseed Raw	℔ gal. casks,	78c. bbls.	80c
" Boiled	"	81c. "	83c
Whale, Crude			
" Bleached Winter			
Sperm, Crude			1 [illegible]
" Winter unbleached			1 [illegible]
" " bleached			1 90
Seal, Extra Refined			
Lard, Pure Winter			
" Spring			1 00
Cotton Seed, Crude			60c
" Southern Yellow			65c
" White			
Neatsfoot, Winter		70c @	$1 10
Natural Lubricating		38c @	40c

Sundries.

Asphaltum	7c
Benzine	℔ gal. 16c
Chalk	1½c
" Block	
Dryer, Patent, Am'n asst'd cans, 10½c.; kegs	9c
" " English " 11c.;	9c
Flocks	
Frostings	50c
Glue, White	33c @ 47c
" Sheet	30c
Glaziers' Points,

Grindstones, Emery, &c.

Walter R. Wood, GRINDSTONES.

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Upon which to run the same, of all kinds.

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Manufacturers of
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THE
Rocky Mountain Vermilion Paint

is "Nature's Compound" of Copper, Mercury, Lead and Iron. A pure Oxide of Metals, containing no earthy matter, hence we claim and are prepared to *prove* that it is the Best and Cheapest Paint in the market. Properly mixed, we will guarantee it to cover double the surface and wear twice as long as ordinary paints. It will not Peel, Scale, Crack or Blister, though subjected to high degrees of heat. It will effectually Prevent the Corrosion of Metals, even in mid ocean. Warranted superior to red lead or any other lead, for any and all purposes for which paint is required. Please send for circulars.

All orders should be addressed, **Wm. H. Corey.** General Agent, 37 Sabin St., Providence, R. I.

Bennett Hotchkiss and N. C. Stiles' Patent.

This Drop (which has been illustrated in this journal of that class in which the Hammer is raised by a stiff belt or board passing up between two friction rolls, and is so well known that we will only describe our improvements. The patents we are working under are those of BENNETT HOTCHKISS (who in an interference case with Goulding and Cheney was declared the first inventor) and N. C. STILES. Our improvements consist:

First.—Of an arrangement of parts that makes it the most complete Jobbing Hammer, and will take the place, to a great extent, of all other kinds for forging. In addition to the upright rod, which is operated by the hammer to open and close the rolls, we place another rod the lower end of which is secured to the end of a lever which is operated by the hand or foot, which operation also opens and closes the rolls at will. The lower end of this rod has a slot, so that the action of the hammer will not disturb the hand lever, thereby preventing the hand being injured, as otherwise would be the case.

Second.—No dog is used on the upright to hold up the hammer. The belt or board passes up between two clamps situated under the rolls, so arranged that as the hammer ascends they will freely open of themselves, but on descending they will close and hold up the hammer. To let the hammer fall the clamps are opened by pressure upon the foot treadle.

Third.—The board or belt is secured to the hammer by an elastic connection, which prevents the sudden jar and destruction of the same. The back roll is made adjustable to different thicknesses of board or belt, as also are the clamps. An adjustable collar on the upright rod allows the operator to obtain *any hight* of blow desired automatically. If one blow is wanted, press upon the treadle and remove the pressure as soon as the blow is given. Keep the foot upon the treadle and the blows will be repeated until the pressure is removed. If a blow of less hight than the collar is set for is required, work the hand lever, which will give you any hight of blow desired. The hammer can be held up at any point below the collar by bringing the hand lever into action when the hammer is at the desired hight, so that the next blow can be given from a state of rest, of less hight than the collar is set for. This is a feature no other drop has; that is, the first blow struck can be of less higit than the second or third, and obtained from a state of rest. A gentle pressure upon the treadle will allow the hammer to go down slowly, but it will stop and remain suspended at any point as soon as the pressure is removed.

The clamps in holding up the hammer keep the boar from touching either roll and prevents the same from being worn uneven.

Manufactured only by the
Stiles & Parker Press Co.,
MIDDLETOWN, CONN.

L. COES'

Genuine Improved Patent

SCREW WRENCHES.

Manufactured by

L. COES & CO.,
Worcester, Mass.

Established in 1829.

Registered March 31, 1874.

We invite the particular attention of the trade to our New Straight Bar Wrench, *widened*, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to *any* strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the *fact*, that in 1869 we made several *important* improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes, which were *at once closely* imitated and sold as the *Genuine* Wrench by certain parties who seem to rely upon *our* improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be *good* evidence that we manufacture a superior Wrench, we wish the trade *may not be deceived* on the question of *originality*. Trusting the trade will fully appreciate our *recent* efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

"L. COES & CO."

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.
HORACE DURRIE & CO., Sole Agents.

Ausable Horse Nail Co.

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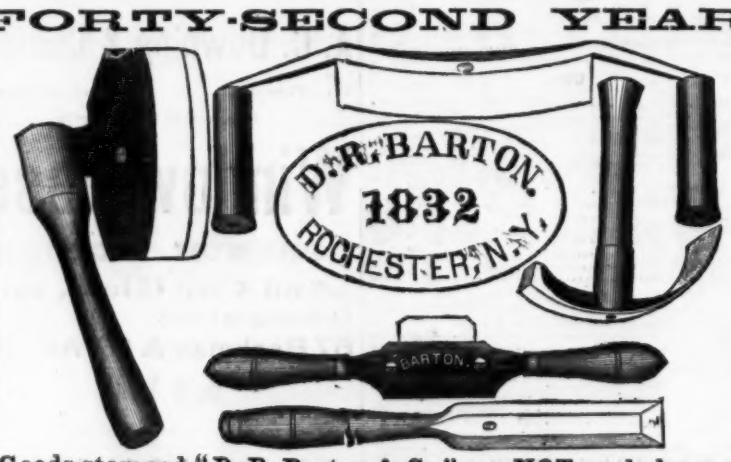

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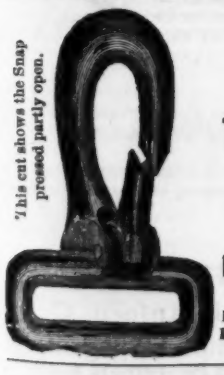

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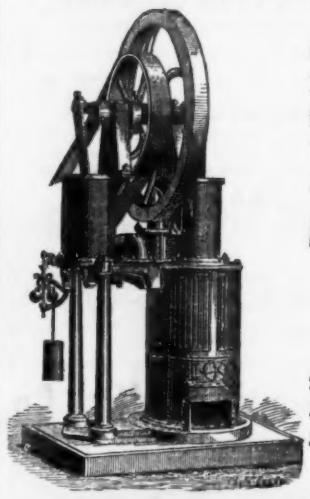

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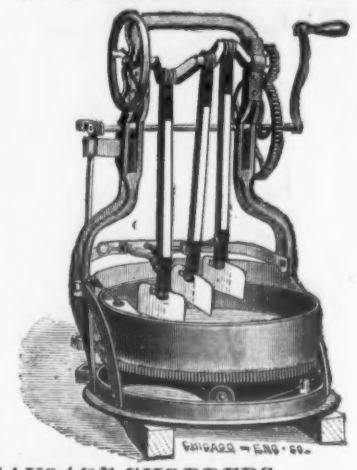

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Fig. 2.

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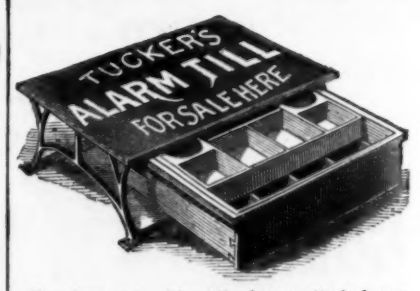

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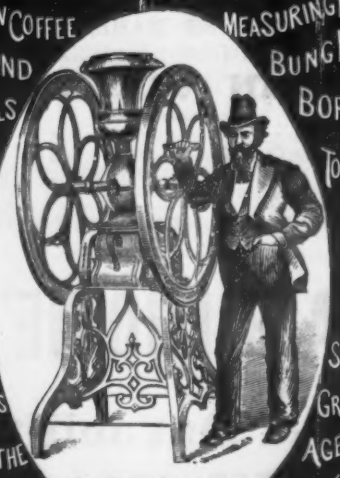

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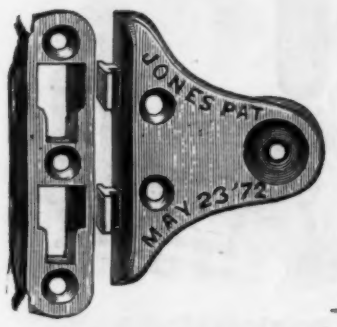

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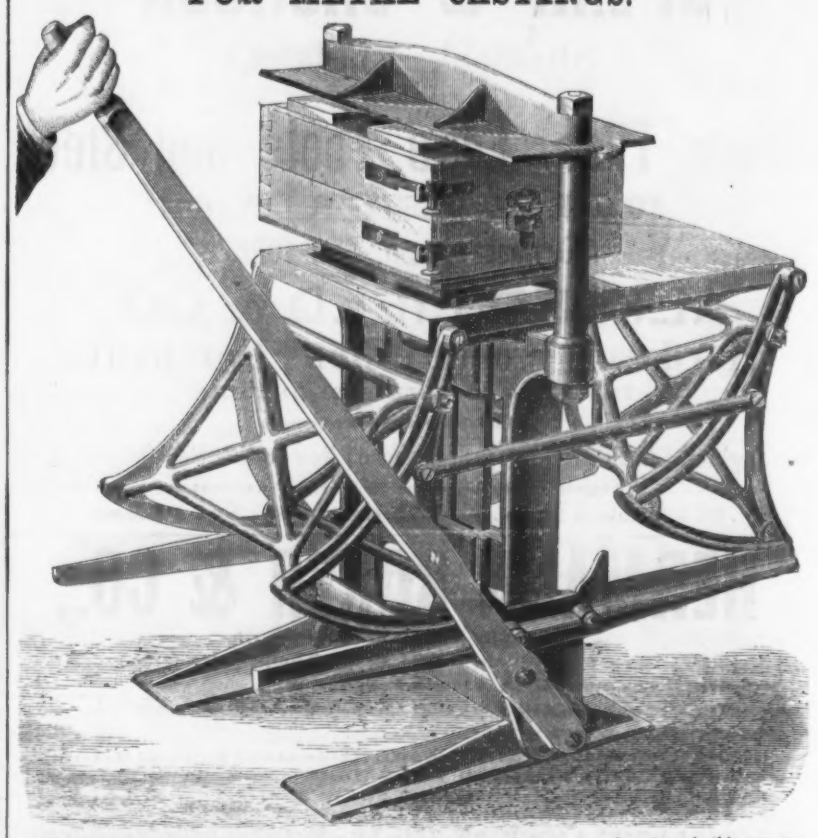

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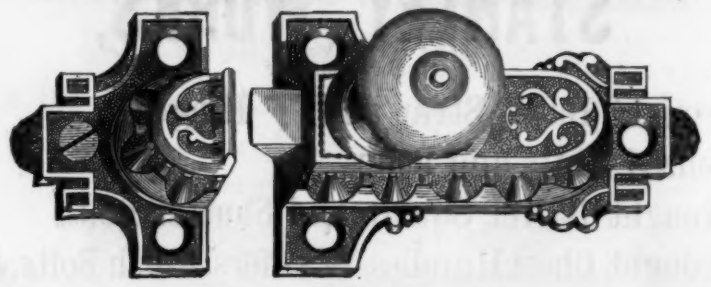

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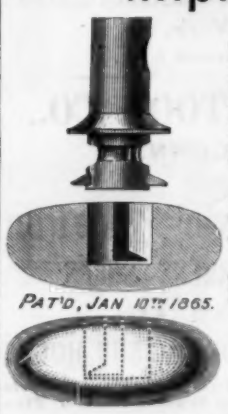

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Connecticut Valley Auger Bits.....dis 35&10 %
Cook s Bits.....dis 40&10 %
Jennings' Bits.....dis 10 %
Bates' Nut Augers.....dis 30&5 %
Douglass' & Ives' Augers.....dis 30&10 %
Watrous' Ship Augers.....dis 10 %
Bonney's Pat. Hollow Augers.....dis 25 %
Stearns' Patent Hollow Augers.....dis 25 %
Balances.—Landers, Frary & Clark's.....dis 20 @ 22½ %
Chattillon s.....dis 20 @ 22½ %
Morton's.....dis 20 @22½ %
Common Spring with Hook.....₩ doz $1 38 @ 2 00
Bells.—Bevin Bros. Mfg. Co. Light Hand Bells.....dis 60&10 %
Other makers light.....dis 65&10 %
Swiss Pattern Hand Bells.....dis 50 %
Connell's Door Bells.....dis 50 %
Great Western and Kentucky Cow.....dis 50&10 %
Boring Machines.—Bates' Mfg. Co., complete with augers.....dis 15 @ 20 %
Douglas Mfg. Co., complete with augers..dis 15 @ 20 %
Common Boring Machines, no Augers.....$4 25 @ 4 00
Anguar “ “ .....5 25 @ 5 00
Belts.—Eastern Carriage Bolts.....special prices
Western “ “ .....“
Philadelphia “ “ .....dis 50&5 @ 50&10 %
“ Eagle, (Coleman's).....dis 50&5 @ 50&10 %
Wrought Snutter.....dis 50 @ 50&5 %
Braces.—Barber s.....dis 40&5 %
Fackus.....dis50 %
Bartholomew s American Ball.....dis 10&10 %
Spoffard.....dis 40 @ 40&5 %
Butts.—Cast Fast Joint, Narrow.....dis 30 %
“ “ Broad.....dis 50 @ 50&5 %
Cast Fast Loose Joint.....dis 50 @ 50&5 %
“ Acorn, Loose Pin.....dis 50 %
Wrought Loose Pin.....dis 35 %
“ Table Hinges and Back Flaps.....dis 40 %
“ Narrow.....dis 30 %
“ Loose Joint.....dis 35 %
“ Reversible.....dis 35 %
Parker's Blind Butts, Sheperd's “, Clark's “, Cherrytree — Discount 50 % by the case 50&10 %.
Lull & Porter's Blind Butts.....dis 45&50 %
Chains.—German Halter.....dis 15 @ 20 %
“ Coil.....dis 15 @ 20 %
Galvanized Pump.....₩ ℔ 15c
Best Proof Coil Chain—

₩ ℔..	13/16	10½	9½	9	8⅜	8½	8c gold
	3-16	¼	5-16	⅜	7-16	½	⅝ in.

By the cask, 500 lbs., discount ½c per lb. Common Chain, ½c per lb. less than proof.
Chisels.—Socket Framing.....dis 60 @ 60&10 %
Socket Firmer.....dis 60 @ 60&10 %
Tang “ .....dis 40 @ 40&10 %
Beatv's Framing and Firmer.....dis 10 @ 15 %
Casters.—Porcelain Wheel.....dis 40&10 %
Iron and Brass Wheels.....dis 40 %
Iron Bed.....dis 40 %
Clothes Wringers.—Universal.....per doz $58 00
Novelty.....“ 58 00
Monitor.....“ 53 00
Discount in 2dozen lots. $2 per dozen.
Coffee Mills.—Common Box and Side.....dis 10 @ 15 %
Patent Box and Side.....dis 10 @ 15 %
Cutlery.—American Pocket (best).....dis 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices.
Drawing Knives.—Hart Mfg. Co. s..dis 60 @ 60&10 %
Concave Adjustable Handle.....dis 10 %
Beatty.....dis 10 @ 15 %
Fry Pans.
Tinned.....dis 30 %

₩ doz..	$3 00	3 25	3 62	4 00	4 50	5 00	5 50	6 00	7 50
No....	0	1	2	3	4	5	6	7	8

Burnished.....

₩ doz..	$2 50	3 00	3 38	3 75	4 12	4 50	5 00	5 62	6 25
No....	0	1	2	3	4	5	6	7	8

Files.
Nicholson Mill Files...new list, $5 00 to £ cur dis 12½ %
“ Bastard.....“ 5 00 to £ cur dis 12½ %
“ Taper.....“ 5 00 to £ cur dis 12½ %
Butcher's Mill.....$5 50 to £ gold
“ Bastard.....5 50 to £ gold
“ Taper.....5 50 to £ gold
Fluting Machines.
K. F. M.—4¼ in. rolls, $5 50.....dis 10 %
“ —6 in. rolls, $6 63.....dis 10 %
Mrs Knox—4 in. rolls, $5 50.....dis 10 %
“ —6 in. rolls, 6 63.....dis 10 %
Hammers.
Yerkes & Plumb's.....dis 15 %
Hammond & Son's.....dis 15 %
Veree.....dis 15 %
Hatchets.
Beatty's.....dis 10 @ 15 %

Shingling and Half.	₩ doz..	$7 00	7 50	7 75	8 00
	No.....	1	2	3	

Yerkes & Plumb.....dis 15 %

Shingling and Half.	₩ doz..	$7 00	7 50	8 00	8 50
	No.....	1	2	3	4
Claw....	₩ doz.	$7 50	8 00		
	No.	1	2		3

Hinges.—Strap and T.....dis 40 %
Parker's Blind, Shepard's “, Clark's “ for wood, Cherrytree Blind for wood, Lull & Porter's Blind — Discount 50 %. By the case 50&10 %.
Clark's Mortise Blind.....by the case dis 50 %
Horse Nails.

Nos.	6	7	8	9	10
Ausable.	27	25	24	23	22
Globe.	28	26	25	24	23
Brundage.	26	24	23	22	21
Nos.	5	6	7	8	9	10
Putnam.	32	28	26	25	24	22

On Ausable, Globe and Brundage 1000 ℔ lots.....dis 5 %
Knobs.—Door, Mortise and Rim.
Makes in Combination.....new list dis 45 %
Extra discount for cash 2 %
Mineral and Rim.....dis 5 %
Locks and Latches.—Rim and Mortise.....dis 45 %
Extra discount for cash 2 %
Till and Cupboard.....dis 25 %
American Padlocks.....dis 50 %
Scandinavian Pad Locks,

₩ doz.....	$10 50	10 50	12 00	13 00	15 00	18 00	dis 15 %
No.....	9	9½	10	10½	11	11½	
₩ doz.....	$18 00	18 00	22 00		22 00		dis 15 %
No.....	12	12½	13		13½		

Trunk Locks.....dis 5 @ 10 %
Thumb and Roggens Latches.....dis 25 %
Lanterns.—Square Candle and Oil.....dis 10 %
Globe for Oil.....dis 10 %
“ “ Kerosene.....dis 10 %
Tubular Lanterns.....dis 10 %
Mattocks.—Long and Short Cutter.....dis 25 %
Western Pattern.....dis 25 %
Pennsylvania Pattern.....dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 20 %
Stebbins' Gates.....dis 60 @ 60&10 %
Lincoln's “.....dis 40 @ 40&10 %
Landers, Frary & Clark's Petroleum...dis 10 @ 10&10 %
Taylor's Petroleum Faucets.....dis 20 @ 20&10 %
Brass Liquor Cocks.....dis 20&10 %
Meat Cutters.—Dixon's.....dis 10 %
Woodruff.....dis 10 %
Stowe.....dis 10 %
Hale's.....dis 10 %
Stuffers.....dis 10 %
Planes.—Auburn Tool Co.. “Bench”.. dis 35 @ 55&5 %
Second Quality.....dis 50 %
Metallic Plane Co.....dis 25&5 %
Evans Pat. Circular.....net
Plane Irons.—American.....list net
Butcher's.....gold £, $5 50
Pick s.—Philadelphia.....net
Pittsburgh.....net
Plumb and Level.
Stanley Rule and Level Co.....dis 60&10 %
Wm. Johnson. (Stanley List).....dis 60&10 %
Rakes.—Cast Steel Garden.....dis 33⅓ %
Malleable Garden.....dis 33⅓ %
Wood Head Iron Teeth.....dis 30 @ 40 %
Rules.—All Maker's Boxwood...dis 60&10 @ 60, 10&10 %
All Makers Ivory.....dis 50 %
Steelyards.—American Pattern.....dis 15 %

₩ doz....	$5 50	7 00	9 00	10 00	11 00	12 00
No.....	50	100	150	200	250	300

English Pattern.....dis 15 %

₩ doz.....	$7 00	8 67	10 67	12 67	14 67	16 67
No.....	50	100	150	200	250	300

L. F. & C. Excelsior.....dis 10 %

₩ doz.....	$9 00	10 00	12 00	15 00	18 00	21 00
No.....	50	100	150	200	250	300

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened.....₩ doz. $11 00 net
Clipper No. 19, Boxed and Sharpened.....₩ doz $10 50
“ 5, “ “ “ 10 00
Common Scythes.....₩ doz $7 00 @ 10 00
Squares.—Steel and Iron, new list.....dis 50 %
Saws.—Disston's Cross Cut.....dis 12½ %
Disston's Hand.....dis 12½ %
W. McNiece's H'd, Cross-Cut & Circ'r, new list..dis 15 %
Boynton's Lightning, new list.....dis 30 %
Shovels and Spades.
Rowland's Plain Back, list Sept. 1st.....dis 30 %
“ Back Strap “.....dis 30 %
Oliver Ames & Sons.....new list dis 12½ %
Brady Shovel Co.....dis 12½&5 %
Sad Irons.—Richmond (polished face).per lb. 4 c. net
Richmond (polished face)... by the cask “ 3¾c. net
Stone.—Arkansas Oil, No. 1.....₩ ℔ $1 38
Turkey Oil, No. 1.....“ 1 00
Washita Extra.....“ 80c
“ No. 1.....“ 22c
“ “ 2.....“ 15c
“ “ 3.....“ 5½c
Screws.—Iron.....new list, Jan. 1st, 1874, dis 52½ %
Brass.....dis 52½ %
Spoons.—
Plated.....dis 40&5 %
Britannia.....dis 40&10 %
German Silver.....dis 30 %
“ Light.....new list dis 15&5 %
Lalance & Grosjean Iron.....dis 10 %
Springs.—Gray's Door.....dis 40 %
Torry's Door.....dis 40 %
Stocks and Dies......dis 15 %
Stove Polish.—Gem.....₩ gross, $5 00
Onyx.....“ $5 00
Try Squares.—Winterbottom.....dis 10 @ 15 %
Stanley Rule and Level Co.....dis 45&10 %
Willis Thrall, No. 2.....dis 30&10 %
Disston's No. 2.....dis 40 %
Tacks, &c.—Half Weight Tacks.....dis 72½ %
“ “ by the case...dis 72½&7½ %
Clout and Finishing Nails.....7½ %
“ “ by the case.....dis 7½ %
Traps.—Genuine Oneida—Newhouse list.....dis 20 %
Imitation “ “ “.....dis 30 %
Vises.—Solid Box.....₩ ℔ nett 15c
Wrenches.—Coes Genuine.....dis 40 %
Coes Imitation Wrought Bar.....dis 50 %
“ “ Malleable Bar.....dis 60 %
“ “ (Kellogg) Malleable Bar....dis 50 @ 10 %
Tafts Pattern (Wrought Bar).....65 %
“ “ Kellogg's (Nail Bar).....dis 65&10 %
Philadelphia Tool Co.'s Pat. Duplex.....dis 25 %
“ “ “ Improved Baxter.....dis 25 %
“ “ “ Adjustable Fork.....dis 25 %
Wire.—No. 0 to 18.....dis 40 %
No. 19 to 26.....dis 45 %
No. 27 to 36.....dis 45 @ 47½ %
Coppered 0 to 12.....dis 15 @ 20 %
Tinned Broom Wire.....dis 20 %
Galvanized Wire No. 0 to 18.....dis 40 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

Sept. 13, 1874.

Augers—Snell Mfg. Co.....dis 20 %
Bits, Auger—Snell Mfg. Co.....dis 20 %
Bells, Cow—Law s Genuine.....dis 30 %
Bolts—Carriage and Tire.....dis 75&10 %
Braces—Bit, Spofford's Patent.....dis 40&5 %
Brads, Cut.....dis 50&7½ %
Boards—Stove, Brooks' Patent.....dis 30 %
Butts—Brass.....dis 25 %
Wrought Narrow.....dis 30 %
“ Broad, Loose Joint.....dis 35 %
“ Table and Back Flaps.....dis 30 %
Wrought Butts, Loose Pin.....dis 35 %
Belting—Rubber.....dis 30 @ 35 %
Leather, new list, oak tanned.....dis 30 %
Brick—Bath (box of 2 doz) Best English.....$1 50
“ Rutherford “.....$1 00
Chalk—White, Carpenter s.....₩ gross, 50c
Red, Carpenter's.....“ 75c
Blue, “.....“ 90c
Chisels—Firmer Socket.....dis 60&10 %
Framing Socket.....dis 60&10 %
Corner Socket Chisels.....dis 60&10 %
Slick's Carpenters'.....dis 60&10 %
Castings—Malleable.....₩ ℔ 10c
Clothes Wringers, “ Novelty ” No. 2.....₩ doz $58 00
Elbows—Corrugated.....5 5½ 6 7 } dis 10 %
Charcoal.....$3 50 4 50 5 25 6 50
Russia.....7 00 9 50 12 00 14 00
Files—Malachoss Bros.....dis 50 %
Freezers Ice Cream—“ Champion.....dis 33½ %
Hammers—Henry W. Kip's.....dis 7½ %
Hinges—Window Blind—
Clark's.....dis 50&10 %
Shepard's and Standard.....dis 55&10 %
Wrought Strap and T.....dis 40&10 %
Hods, Coal—Plain, Black and Galvanized.....dis 10 %
Funnel, Black and Galvanized.....dis 10 %
Fancy and Helmet.....dis 10 %
Prince Coal Vases.....dis 10 %
Hooks and Staples—Wrought.....dis 60&10 %
Hooks—Belt.....dis 50&10 %
Hasps and Staples—Wrought.....dis 60&10 %
Sad Irons.....4c
Kettles—Brass.....₩ ℔ 50c
Enameled.....dis 50&5 %
Knives, Drawing—Oval No. 1.....dis 60&10 %
Razor Blade.....dis 50&10 %
Lanterns “Peerless,”.....No. 1 5 10
₩ doz $26 00 $10 50 $13 75 dis 10 %
Tubular “ with Guards.....
Machines—Apple Paring, “Turn Table”.....$8 00 ₩ doz
Mills, Coffee—Box and Slide, common.....dis 15 %
Box Union and Eagle.....dis 15 %
“ American “.....dis 20 %
Nails—Clout and Finishing.....dis 7½ %
Shoe.....dis 7½ %
Horse, Ausable.....No. 5 6 7 8 9 10
30 27 25 24 23 22c
“ “ Finished & Pointed.....add 1c ₩ ℔
“ “ 1000 lbs.....dis 5 %
“ Clinton.....No. 6 7 8 9 10
22 20 19 18 17c
Packing—Rubber.....dis 20 @ 35 %
Pencils, Slate—Soapstone.....4 5 6in.
30 40 50c. ₩ 100
Case lots.....dis 20 %
Paint—White Lead, U. S. Gov't.....dis 25&7½ %
Rivets—Iron, Black and Tinned.....dis 25&7½ %
Rope—Manila, ½ inch and larger.....₩ ℔ 15½c
Screws—“American Screw Co”—
Flat Head, Iron.....dis 52½ %
Flat Head, Brass.....dis 52½ %
Staples—Blind, Boardman s Pat., ½ & ⅝.....₩ ℔ 37c
Spoons, Iron Tinned.....dis 10 %
“ by the case.....dis 20 %
Plated Rogers' A No. 1.....dis 40&10 %
Britannia.....dis 45&10 %
Squares—Steel and Iron.....new list 50 %
Shoes, Horse—H. Burden & Sons.....₩ keg $6 00
Saws—Henry Disston & Sons.....dis 10 %
Scales—Buffalo Scale Works.....dis 25 %
Fairbanks.....dis 15 %
Traps, Steel—Newhouse.....dis 20 %
Tacks—Half Weight Am. Iron.....dis 72½&7½ %
Vises—Parallel, Buffalo.....dis 20 %
Ware—French, Tinned and Iron.....dis 25 %
Stamped and Japanned.....dis 10 %
Cast Iron Hollow.....dis 33½ %
Tin Plates.—Add for each X.....₩ 50
10x14, I C. Charcoal...$11 25 | 14x20 C. terne.....$10 25
12x12, “ ... 11 75 | 20x28 C, “ ... 21 50
12½x17, “ ... 10 75 | 20x28 X. “ ... 20 00
14x20, “ ... 12 25 |
Pig Tin—Straits.....28c @ 29c
Bar Tin.....30c
Solder.....No. 1, 15c; No. 2, 14c
Sheet Zinc—
“ Lasalle ”.....520 100 ℔ casks
Sheets.....$10 00 10 50 ₩ 100 ℔s
Iron Wire—Bright and Annealed.....dis 40 %
Coppered.....dis 40 %
Tinned.....dis 15 %
Tinned Broom, Nos. 20 21 22 ....dis 20 %
Copper—Sheathing 14 @ 18 oz.....₩ ℔ 38c
Planished.....₩ ℔
Bottoms.....₩ ℔ 33c
Bolts.....₩ ℔ 35c
Braziers' Sheets.....₩ ℔ 35c
Sheet Iron.—
18 Common.....$4 25
24 Common.....5 25
24 W. D. Wood & Co., Smooth Finish.....5 90
Am. Russia.....A. 15c B. 12c
Gen. Russia, No. 1 stained.....18c
“ “ clean.....19c
Galvanized.....dis 15 %

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers Metals, No. 214, 216 and 218 Main street.

Tin Plate.—I. C. 10x14 Charcoal.....$11 50 @ 12 00
I. X. 10x14 Charcoal.....14 50 @ 15 00
I. C. Terne 14x20.....10 00 @ 12 25
I. C. Terne 20x28.....21 50 @ 23 50
I. C. Continuous.....24 00
Block Tin.—
Pig.....₩ ℔ 27c @ 29c | Bars.....₩ ℔ 31c
Solder.—
S. & Co.....₩ ℔ 23c | A I.....₩ ℔ 19c
Roofing “ 17c
Lead.—Pig.....₩ ℔ 7½c. | Bar.....₩ ℔ 8½c
Copper.—
Ingot.....₩ ℔ @ 24c | Sheets, 6 to 9 lb...₩ ℔ 38c
Planished.....“ @ 42c | “ 10 to 12 oz...“ 35c
Sheathing.....“ @ 38c | Braziers 13 lb.....“ 32c
Copper Drops @ 36c | Copper Bottoms..“ 34c
Zinc. Cask, 500 to 1000 lbs.....₩ ℔ 10½
Case, 100 lbs.....“ 11 c
Slab.....“ 7½c
Brass.—
Roll, No. 6 to 20. ₩ ℔ 30c | Roll, No. 38 to 40...₩ ℔ 50c
“ 20 to 36. “ 35c | Wire, No. 0 to 20...₩ ℔ 35c
“ 20 to 25... “ 40c
Babbit Metal.—
Sellew & Co.....₩ ℔ 25c | Allens'.....₩ ℔ 20c
Market.....“ 12c
Antimony.....₩ ℔ 17c
Bismuth.....₩ ℔ $4 00
Nickel.....₩ ℔ $4 50
Sheet Iron.—
Gen. Russia.....₩ ℔ 20c | Planished A.....₩ ℔ 18c
“ B.....“ 12½c

	Com. B.	Smooth Fin. S. I. U.	Smooth D Re'fd.
15 to 20	4·4c	5·5c	7·5c
22 to 24	4·6c	5·6c	7·6c
26	4·8c	5·8c	7·8c
27	5·0c	6·0c	8·0c

Galvanized Iron.—Full bundles.....dis 20 %
Nos. 18 to 20.....12c | No. 26.....14c
22 to 24.....13c | 27.....15c
Bar Steel.—Silver, ₩ ℔ 16c; Crescent, 21c.
Iron Wire......dis 33 %
Enameled Ware......dis 45 %
One Piece Corrugated Elbows......dis 10 %

Charcoal Iron.		Russia Iron.	
4½ inch.....	₩ doz $2 50	4½ inch.....	₩ doz $5 00
5 “	“ 3 50	5 “	“ 7 00
5½ “	“ 4 50	5½ “	“ 9 50
6 “	“ 5 25	6 “	“ 12 00
7 “	“ 6 50	7 “	“ 14 00

Leader Elbows, Flat Crimp Retinned or Galvanized.—Dis. 10 %

	₩ doz.		₩ doz
2-inch.....	$1 75	2½-inch.....	$2 75
3-inch.....	2 25	3½-inch.....	3 25
4-inch.....	2 50	4½-inch.....	3 50

Sheet Iron Bread Pans.....₩ ℔ 10c
American Broilers.....₩ doz. $13 50
Tinmen's Machines.....dis 5 %
Sad Irons.....₩ ℔. 3½c
Brass Kettles.—Ansonia.....48c
Dog Irons.....3½c

PITTSBURGH.

The following are the Card rates of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St., New York, Agent. Iron, standard list assorted sizes, for large orders, c, card rate, 2 % off net.
Flat Rail (1½x¼), punched and coun'sunk..4·4c ₩ ℔ net
Iron Wedges.....4½c ₩ ℔ net
Norway Nail Rods.....9¼c ₩ ℔ net
Crow Bars (in ordering please state whether “Wedge” or “Pinch” point).....5c ₩ ℔ net
Beetle Rings.....5½c ₩ ℔ net
Fence Pickets—
⅜ round, bent to shape, 30c ₩ ft. of fence, less 15 % off net.
Discount off Standard List.
Carriage and Tire Bolts (new list).....70&10 % off net
Plow Bolts.....30, 10&5 % off net
Stove Bolts.....15 % off net
Machine and Square Head Bolts.....30&10 % off net
Coach and Lag Screws.....30&10 % off net
Bolt Ends.....35 % off net
Pat. Hot Pressed Square and Hexagon Nuts, small sizes, from 3-16 to ⅜ in.....7½c ₩ ℔ off net
Pat. Hot Pressed Square and Hexagon Nuts, large sizes, from 7-16 to 2 in.....6 c ₩ ℔ off net
Washers, all made from new band iron, small sizes, from 3-16 to ⅜ in.....9 c ₩ ℔ off net
Washers, all made from new band iron, large sizes, from 7-16 to 1⅛ in.....7 c ₩ ℔ off net
Nuts and Washers in 25 lb. boxes, 1c ₩ ℔ ex. Nuts and Washers in lots less than one keg each size, 1c ₩ ℔ ex. Nuts and Washers in 5 lb. boxes, 1½c. ₩ ℔ ex.
Harrow Teeth, in lots of 1 ton or more, packed in casks, 1 in. diam. 3½c ₩ ℔ net; ⅞, ¾ in. diam. 3¾c ₩ ℔ net; ⅝ in. diam. 4c ₩ ℔ net.
Patent Headed Harrow Teeth, packed in casks, ½c ₩ ℔ ex
Skein Bolts, in bulk, in lots of 1 keg or more, ⅝ in. diam. 5½c ₩ ℔ net; 9-16 in. diam. 6½c ₩ ℔ net; ¾ in. diam. 7½c ₩ ℔ net. 1c ₩ ℔ extra when less than 1 keg of each size is ordered.
Screw Hook-and-Eye Hinges, ¾ to 1 in. diam. 9c ₩ ℔ net; ⅝ in. diam. 10c ₩ ℔ net; ½ in. diam. 12 c ₩ ℔ net.
Screw and Strap Hinges, in lots of 100 pairs or more, 14 to 36 in. long, 5½c ₩ ℔ net; 8, 10 & 12 in. long, 6¾c ₩ ℔ net
Strap and T Hinges.....20 & 10 % off net, delivery as customary.
For purchases amounting to $250 between May 30th and December 31st, 5 % extra off.
Screw Hitching Rings.....$5 25 ₩ 100 net
Duck Nest Tuyere Irons.....$14 50 ₩ doz net
Cast Iron Washers.....₩ ℔ 4c net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long.....₩ ℔ 4 c net
1 to 2 in. diam. from 4 to 8 ft. long.....“ 4½c net
1 to 2 in. diam. from 1½ to 4 ft. long.....“ 4¾c net
⅞, ¾ and ⅝ in. diam. over 4 ft. long.....“ 4¾c net
⅞, ¾ and ⅝ in. diam. from 1½ to 4 ft. long “ 5¼c net
Bridge bolts w th upset ends.....¼c. ₩ ℔ extra
Wrought iron plates, punched.....5c. ₩ ℔ net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ₩ set of 8 bolts.. 55c
12 “ ½ “ “ 8 “ .. 70c
10 “ 9-16 “ “ 8 “ .. } 90c
12 “ 9-16 “ “ 8 “ ..
14 “ 9-16 “ “ 8 “ .. $1 00
10 “ ⅝ “ “ 8 “ .. } 1 00
12 “ ⅝ “ “ 8 “ ..
14 “ ⅝ “ “ 8 “ .. 1 10
16 “ ⅝ “ “ 8 “ .. 1 20
5c ₩ set for each additional inch over 14 in. All lengths made.
In ordering Box Strap Bolts please give diameter at Screw End.
Wagon Box Rods, narrow track, each.....18c
“ “ wide track, each.....20c
Single Tree Irons, ₩ set of four pieces.....36c
Wrought Iron Bolster Plates, 2¾ in. wide, ₩ set.....60c
“ “ 3 “ “ “.....65c
“ “ 3¼ “ “ “.....70c
“ “ 3½ “ “ “.....75c
Wagon Brake Ratchets, each.....16½c
“ “ finished with guard, each..45 c
Wrought Hammer Straps, heavy pattern, each.....16 c
“ “ light “ each.....13½c
“ Rub Irons, each.....11 c
Stay Chain Hooks, each.....8 c
Double and Single Tree Clips, figure 1, each.....9 c
“ “ “ “ 2, each.....10 c
“ “ “ “ 3, each.....12 c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks and Clips, in lots of 50 sets.....dis 25 %
Wagon Box Staples, 1¼ to 2¾ in. to clinch, ₩ 1000 $11 00 net
“ “ “ Bevel Box Iron, to rivet on, ₩ 1000 7 50 net
Neck Yoke Eyes, each.....4½c net
“ “ with ⅜ rings, each.....7¼c net
King Bolts, ¾, 1, 1¼, and 1¼ in. diam.....₩ ℔ 4½c net
Wagon Rivets, ex. large, flat, oval and steeple head, ½ in. diam. all lengths.....“ 8¼c net
Wagon Rivets, 3-16 in. diam., all lengths.....“ 9½c net
“ & Nails, in 5 ℔ paper boxes.....₩ ℔ 1c extra
“ “ in 25 ℔ wood “ ½c extra
Wagon and Hinge Nails, ¼ in.....₩ ℔ 17 c net
“ “ 5-16 in.....“ 19 c net
Double Tree Plates.....“ 8½c net
Coupling “.....“ 8½c net
Tongue “.....“ 9 c net
Neck Yoke Plates.....“ 11 c net
Tongue Cap Iron, 1¼, 2 & 2¾ in. wide, same price ₩ ℔ as Band Iron.
Wagon Chains, Stay Lock and Tongue, 5-16 in, ₩ ℔ 10½c net. ¼ in., 11½c. net

DETROIT.

(Reported by Messrs. Jewett & Root.)

Tin Plate.—Best Charcoal
IC, 10x14.....$11 25
IX, 10x14.....14 00
XX, 10x14.....15 75
IC, 12x12.....11 75
IX, 12x12.....14 50
IC, 14x20.....12 25
IX, 14x20.....15 00
XX, 14x20.....17 75
XXX, 14x20.....20 50
XXXX, 14x20.....23 25
DC, 100 Plate.....10 75
DX, “.....12 50
DXX, “.....16 25
DXXX “.....18 00
DXXXX 100 Plate..21 75
IX, 14x14.....23 25
IC, 10x14 W.....10 75
IX, 10x14 W.....13 50
Roofing Tin.—Best Char.
IC, Terne, 14x20.....$10 25
IX, “ 14x20.....13 00
IC, Terne, 20x28.....21 50
IX, “ 20x28.....25 50
Coke Tin.—
IC, 10x14 Coke.....9 50
IX, 10x14, Coke.....12 25
IC, 14x20, “.....10 50
Sheet Zinc.—
Any width.....11c
Copper.—
Sheathing.....32c
Copper Bottoms.....32c
Planished Copper.—
Sheathing, 14x48.....39c
Boiler Size, No. 7.....41c
“ “ No. 8.....41c
“ “ No. 9.....41c
Tinning ₩ sheet, 14x48 10c
“ “ No. 7 10c
“ “ “ 8 14c
“ “ “ 9 16c
Pig Tin.—
Large Pigs.....29c
Small Pigs.....29c
Bars.....30c
Solder.—No. 1.....17c
No. 2.....16c
Bright Wire...dis 37½ %
Sheet Iron.—
No. 18 Am. Com.....4 80
No. 24 Am. Com.....5 00
Russia. No. 9, 10, 11 & 12.18½c
W. D. WOOD'S & CO.'S SHEET IRON.—
Nos. 15 to 20 Smooth $4 10
“ 21 to 24.....4 50
“ 25 & 26.....6 50
“ 21 to 24 Char'l..7 80
“ 25 & 26 “ ..8 00

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,
303 Walnut St.,
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MINERS AND SHIPPERS OF
Lehigh Coals.
The following superior and well-known Lehigh Coals are mined by ourselves, and firms connected with us, viz.

A. Pardee & Co.	HAZLETON, CRANBERRY, SUGAR LOAF
G. B. Markle & Co.	JEDDO, HIGHLAND.
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OFFICES:
WM. LILLY, Mauch Chunk, Pa.
WM. MERSHON, Agent, 111 Broadway N.Y
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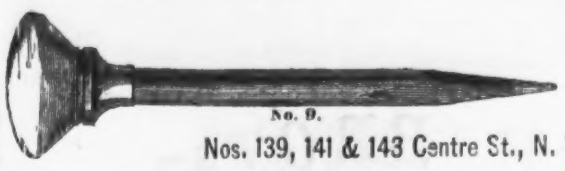
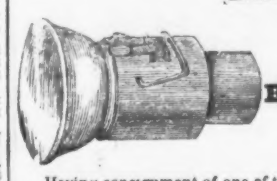
MARKT & CO.,

No. 9.
Nos. 139, 141 & 143 Centre St., N. Y.
MANUFACTURERS AND IMPORTERS OF
Hardware Specialties,
DOOR KNOBS (Lava, Wooden, Porcelain & Mineral), SHUTTER, PICTURE AND DRAWER KNOBS,
Plate and Drop Escutcheons, Picture Nails and Curtain Pins,
BRIGHT WIRE GOODS,
Alarm Whistles and Mouthpieces,
FURNITURE NAILS,
Bright Halter & Coil Chains, French Wire Nails,
Wrought Iron and Brass Butts.

Having consignment of one of the largest German manufacturers of Halter and Coil Chains we can offer inducements on these goods.
We shall be pleased to send our new lists and prices to those who will apply.

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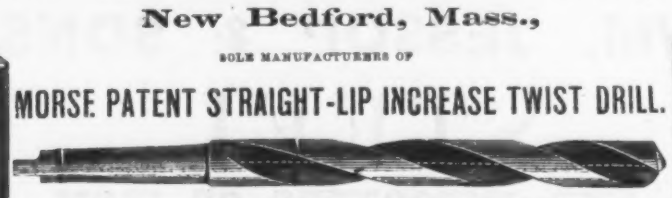
SOLE MANUFACTURERS OF
MORSE PATENT STRAIGHT-LIP INCREASE TWIST DRILL.

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EDWARD S. TABER, Treasurer.

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(Successor to MATTHEWS & MOORE,)
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Manufacturers of the
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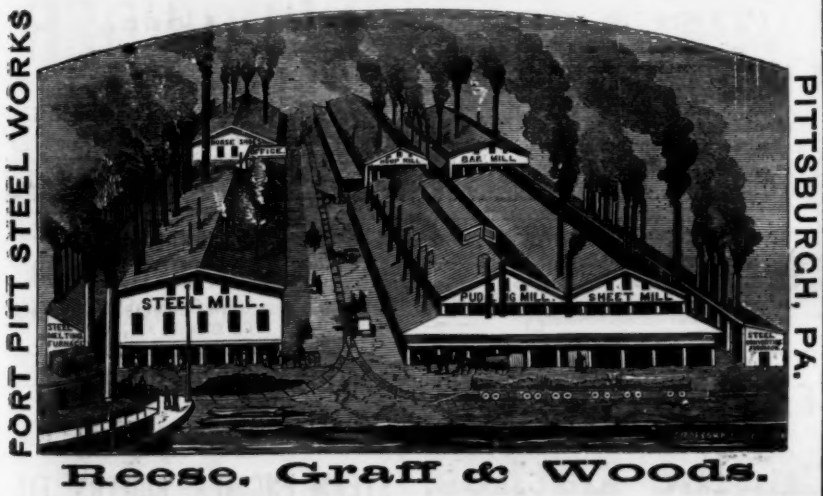

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COVERING ALL LOSS OR DAMAGE TO

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ARISING FROM

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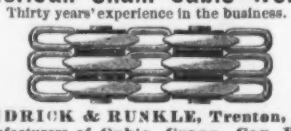

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Also, Latest Improved Cotton Can Rings.

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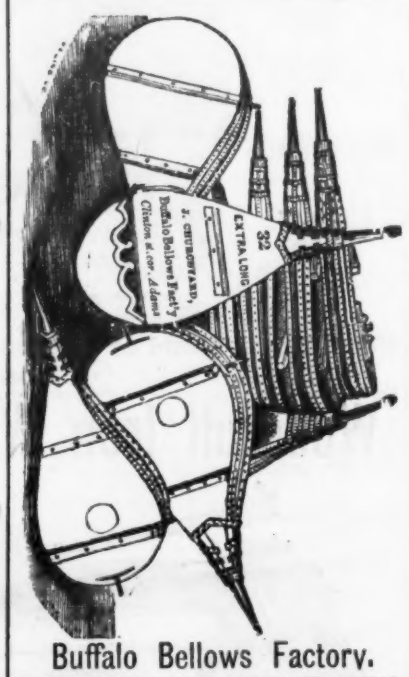

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Magic Pump.

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Tin Plate.—

10x14, IC, Ch'l. Good.	$	14x20, IX, Ch'l Best.	$15 00
10x14, IC, " Best.	11 50	14x20, IXX, " "	17 50
10x14 IX, " "	14 00	14x20, IXXX, " "	20 00
12x12, IC, " "	12 00	DC, 100 Plate, " "	21 50
12x12, IX, " "	14 50	DX, " "	14 00
14x20, IC, " "	12 50	DXX " "	16 50
		DXXX, " "	19 00

Roofing IC, Charcoal, Best..... 11 00
Roofing IX, Charcoal " 13 50
20x28, IC, Charcoal Roofing, Com 21 00
20x28, IC, " Good..... 21 50
20x28, IC, " Best 22 00
20x28, IX, " " 26 50
10x14, IC, Coke Plates..... 10 00 @ 10 50
14x20, IC, " ..... 10 50 @ 11 00
10x20, IC, ... 16 50

Block Tin.—

Large Pigs ..... 28c | Bars..... 30c
Small..... 29c | Straits, 2c. higher.

Zinc.—Sheet, 500 to 1000 lb. Casks..... 10½c
Loose Sheets..... 10½c
Slab Zinc or Spelter..... 6½ to 8c

Copper.—Bottoms.

Sheathing..... 32c
Planished..... 36c
" Boiler lengths..... 40c
Ingot..... 24c to 26c
Bolt..... 40c

Braziers' Sheets.—

30x60, 6 to 10 lbs.. ₩ lb 41c | 30x60, 15 to 100 lbs.. ₩ lb 35c
30x60, 10 & 12 lbs.. " 38c

Solder.—F. S. & Co.'s make.

Best Fine..... 22c | Roofing..... 18c
No. 1..... 20c | Braziers' or Spelt. Sold.. 35c

Antimony..... 18c

Babbit Metal—F. S. & Co.'s..... 16c
No. 2..... 14c

Sheet Iron.—

	Common.	Smooth. Com.	Smooth Charcoal.	Smooth Juniata.
No. 24.....	5 c	6 c	7½c	9½c
25 & 26..	5½c	6½c	7¾c	9¾c
27.....	5¾c	6¾c	8 c	10 c

Galvanized Iron..... dis 20 %

No. 16 to 20	12c	No. 24	15c
21 to 24	13c	26	16c
25 & 26	14c		

Russia Iron.—

Perfect..... 20c | No. 1 Stained..... 19c
In Sheets, 1c. higher.

American Russia.—

A..... 15c | B..... 12c
In sheets, 1c higher.

Lead.—

Pig..... 7½c | Lead Pipe, in full coils .8½c
Bar..... 8½c | Lead Pipe, when cut.. 8½c
Sheet Lead..... 8½c

Wire—Bright..... dis 35 %
Coppered..... dis 30 %

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(Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.)

Augers.—Watrous Ship..... dis 10 %
L'Hommedieu Ship..... dis 15 %
Axes.—Forester's Favorite, Bronzed..... $12 00
Blue Jackets, Blue..... 11 5
Excelsior, Black..... 11 00
Chopper's Pride, Bronzed..... 10 50
Red Cross, Red..... 10 00
Red Cross, Handled..... 12 50
Boy's Handled Blue Jackets..... 12 00
Axe Handles.—Wadleigh's Oak—
A (Extra) $2 50. B (No. 1) $2 00. C (No. 2) $1 50 ₩ doz
Bells, Sleigh—
Fancy Body, Patent Leather, Cloth Bound, White Metal, 30, No. 1..... $1 70
Fancy Body, Patent Leather, Cloth Bound, White Metal, 36, No. 1..... 1 80
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 30, No. 1..... 2 38
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 36, No. 1..... 2 50
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 30, No. 1..... 3 38
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 36, No. 1..... 3 50
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1..... per pair, 50c.
Common, 6, No. 1..... " 45c.
Blind Hinges.—Washburn's..... per hundred set $8 75
Blind Pulls.—Washburn's..... per hundred set $3 75
Bolts.—Carriage, Phila.. " Girard Works..... dis 50&10 %
Borax.—Best Refined..... ₩ lb 14c
Borers.—Angle. Backus'..... dis 30 %
Boring Machines.—Angle..... each $4 75
Common. Snell's quality..... each 3 75
Braces.—Barber's..... dis 40&5 %
Backus'..... dis 50 %
Spofford's..... dis 40 %
Amidon..... dis 45 %
Brass Faucets.—L. F. & C..... dis 25 %
Butts.—Union Drilled Loose Joint..... dis 60&10 %
" " Wire Fast Joint..... dis 55 %
" " Acorn Loose Joint.. dis 60&10 %
Brass Butts..... dis 30 %
Wrought Table Butts and Back Flaps..... dis 30&10 %
Wrought Narrow Butts..... dis 30&10 %
Can Openers—Sprague's..... dis 50 %
No. 1, Iron Handle..... $4 00
No. 2, Wood Handle..... 4 50
Cartridges.—" U. S. Cartridge Co."..... dis 50&10 %
Chisels.—"Buck Bros.' Shank Goods.. add 20 @ 22½ %
Socket..... add 22½ @ 25 %
Coal Hods..... dis 35 %
Fancy Japanned, No. 4, 15 in., $8 00; 5, 16 in., $9 00; 6, 17 in., $10 00.
Fancy Galvanized, No. 4, 15 in., $11 50; 5, 16 in., $13 00; 6, 17 in., $14 00.
Perfection, Jap'd, No. 4, 15 in., $12 00; 5, 16 in., $13 00; 6, 17 in., $14 00.
Perfection, Galv'd, No. 4, 15 in., $15 00; 5, 16 in., $16 00; 6, 17 in., $17 00.
Morning Glory, Jap'd, No. 4, 15 in., $12 00; 5, 16 in., $13 00; 6, 17 in., $14 00.
Morning Glory, Galv'd, No. 4, 15 in., $15 00; No. 5, 16 in., $16 00; No. 6, 17 in., $17 00.
Compasses and Dividers.—Bemis'..... dis 35 %
P. S. & W..... dis 25 %
Cordage.—Manila (usual trade dis.)..... ₩ lb, 15c
American Tarred Hemp Lath Yarn..... ₩ lb, 10c
Corn Hooks..... per doz $2 75
Cow Ties..... dis 10 %

No. 33, Open Ring,	3	foot,	No. 6,	with Toggle	$3 70
No. 35,	3	"	No. 6,	" Snap	3 90
No. 40,	3¼	"	No. 5,	Toggle	4 25
No. 45,	3½	"	No. 5,	" Snap	4 40
No. 50,	4	"	No. 4,	" Toggle	4 85
No. 55,	4	"	No. 6,	" Snap	5 00
No. 60,	4½	"	No. 3,	" Toggle	5 60
No. 65,	4½	"	No. 3,	" Snap	5 80

Crow Bars.—Iron. Steel Points..... ₩ lb, 5½c
" Sweet" Steel Bars..... ₩ lb 11c
Brown's Steel Bars..... ₩ lb 10c
K. P. & Co. Extra Drill Steel..... ₩ lb 15c
Dividers.—Cook's Nickel Plated..... dis 15 %
Door Springs.—Stimson's Patent.—
No. 7, Light inside doors, $12 00..... dis 25 %
No. 8, " outside " $18 00..... dis 25 %
Torrey's..... $4 00
Emery.—Alden..... ₩ lb 6½c
Wellington Mills..... ₩ lb 10c
Files.—Earl Smith & Co.'s English..... $5 to £ gold
American..... 5 to £ currency, less 12½ %
Nicholson..... 5 to £ currency, less 1 ½ %
" Regular Taper..... dis 12½&5 %
Stubb's Tapers, genuine, 3 in., $1 50; 3½, $1 62; 4, $1 88; 4½, $2 13; 5, $2 50.

Funnel Irons.—$2 50 2 50 2 50 3 25 per doz

5,	5½,	6,	7 inch.
Deep Flange.—$3 50	3 75	4 00	
5,	5½,	6 inch.	

Hammers.—Maydole..... dis 5 %
M., B. & D., solid cast steel, adze eye, No. 1, $10; 1½, 8 75
" " " " bell face, No. 1, $11; 1½, $9 75.
Hangers & Rollers.—Novelty..... dis 30 %
Anti-Friction..... $1 75 per pair—dis 30 %
Hatchets.—Underhill Edge Tool Co..... dis 15 %
C. F. Dowse, warranted Cast Steel—
Shingling..... 0, $4 75; 1, $5 25; 2, $5 75
Claw..... 1, 5 75; 2, 6 25
Lathing..... 1, $5 50
Axe Pattern..... 1, $7 00; 2, 7 50
Broad.... 0, $5 75; 1, $6 50; 2, $7 50; 3, $8 25; 4, $10 75; 5, $12 75; 6, $14 75.
Hinges.—Strap and T, Stanley Works..... dis 55&10 %
Plate, Loose and Fast Joint..... ₩ lb 7½c
Wrought Screw Hook..... ₩ lb 8c
Hoes.—Ely Balch & Co. M., B. & D.'s list, 1874.. dis 25 %
Remington, M., B. & D.'s list, 1874..... dis 30 %
Lanterns.—Tubular No. 0..... $9 50
Guarded. No. 74, (with kerosene oil and candle burners)..... 6 25
Lead.—Sheet and Pipe..... 9c—less 10 %
Locks.—P. & F. Corbin..... new list dis 45&5 %
Nashua..... dis 45&5 %
Manure Forks.—
Myers & Ervien, M., B. & D.'s list, 1874 ..... dis 25 %
Peck, Clark & Co., " " ..... dis 25 %
Shumway & Co.. " " ..... dis 30 %
Mattocks.—K. P. & Co.. axe finish, long cutter.. $13 75
Snort cutter..... 13 50
Meat Cutters.—" Miles's" Challenge..... dis. 30 %
No. 1, $22 00; 2, $30 00; 3, $40 00.
Metal.—Babbitt, No. 1, 35c; 2, 25c; 3, 16c; 4, 15c ₩ lb
Nails.—10d and larger..... unsettled
Nail Pullers.—Little Giant—Small..... per doz., $22 00
Little Giant—Large..... " 30 00
Padlocks.—Wilcox..... dis 50&2 %
All Brass, 2½ inch, 2 keys, job lot..... $9 00
Picks.—K. P. & Co., Polished Points—
5 to 6..... per doz ₩ 00; 6 to 7, $9 50
Pins.—Universal flat and Coat all wood—
2 in..... ₩ gross $2 50; 3 in., 3 50; 4 in., 4 50—dis 15 %
Potato Digger.—
" Partridge," 6 square tine..... ₩ doz $12 00
Shumway & Co., 6 round tine..... ₩ doz 9 00
Pulley Blocks,—" Best Boston Make"..... net
Common Strapped Blocks—

4	5	6	7	inch.
Single, 75c.	85c.	$1 00	$1 13	each.
Double, $1 00	1 12	1 25	1 00	"

Inside Iron Strapped Blocks—

5	6	7	8	7	10	inch.
Single, $1 00	1 13	1 25	2 00	2 25	1 75	each.
Double, 1 88	2 30	2 62	3 63	4 00	5 00	"

Inside Iron Strapped Blocks, with Patent Roller Bushings—

5	6	7	8	9	10	inch.
Single, $1 25	1 50	1 65	2 50	2 65	3 50	each.
Double, 2 50	3 00	3 38	4 63	5 00	6 50	"

Plated Ware.—Rogers bros..... new list dis 40&10 %
Plumb & Levels.—" Davis" Pat. Adjustable—
No. 1, Iron and Wood Center Levels..... dis 50 %
No. 2, First Quality Levels..... dis 60&10 %
No. 3, Iron Pocket " ..... dis 35 %
No. 4, Level and Plumb Glasses..... dis 60&10 %
No. 5, Iron Pocket Levels, per square and straight edge..... dis 50&10 %
No. 6, Improved Iron Bench Planes..... dis 20&10 %
Pocket Knives.—Conn. Cutlery Co..... new net list
American Shear Co..... dis 33½ %
Rakes.—Cast Steel, garden..... dis 30 %
Malleable..... dis 25 %
Rail Barn Door.—For Novelty and Anti-Friction Hangers..... per foot 7c.. dis 30 %
Rivets.—Black..... dis 25 %
Carriage, oval head, Nos. 3, 4, 5, 6, 7, 8,
13 13 14 14 15 16c ₩ lb net
Rubber Moldings.—" Harmon's"..... dis 10 %
No. 2, for Windows..... per foot, 5c
No. 3, for Doors..... per foot, 10c
No. 4, " ..... per foot, 12c
Sad Irons.—Bliss & Drake..... ₩ lb 4
Sand Paper—0 to 2, $4 25; 2 to 3, $4 75..... dis 10 %
Saws.—*Hand and Panel—*
Wheeler, Madden & Clemson's, same list as "Disston's"..... dis. 15 %
Disston's..... dis. 12½ %
Cross Cut—
Wheeler, Madden & Clemson X Cuts..... per ft., 37c
" " " "Star" X Cuts. " 60c
" " " Champion X Cut. " 90c
" " " One Man X Cut..each, $2 25
Boynton's genuine Lightning X Cut..... per ft., 60c
" " " One Man X Cut..each, $2 25
Circular—Wheeler, Madden & Clemson's..... dis. 25 %
Mill— " " ..... dis. 25 %
Screws.—American Screw Co..... revised list dis 62½ %
Aiken's..... dis 50&10 %
Scythe Stones.—
" Willoughby Lake," first quality..... ₩ gross $4 50
" " second quality..... " 3 00
Shovels.—O. Ames..... new list dis 12½ %
M. B. & D..... new list dis 12½ %
Snow, Malleable Iron Tip, D Handle—Agents for New England..... $6 50
Snow, Malleable Iron Tip, long Handle—Agents for New England..... 5 50
Sifters.—Coal, Rice, &c..... $12 00
Spading Forks.—M. & E..... dis 25 %
Stone Pickers.—" Partridge," original.. ₩ doz $15 00
Tools.—Aiken's Pattern, 20 in set; Parr's.. $6 00 per doz
Traps.—Oneida..... dis 20 %
Blake's..... dis 50 %
Vises.—K. P. & Co.'s Solid Box, Blacksmith.... ₩ lb 13c
Parker's Parallel..... dis 10 %
Backus..... dis 25 %
" Howards." Parallel..... dis 20 %
Wardrobe Hooks.—Wire to drive..... ₩ gross $1 00
Weather Strips.—" Harmon's".. per doz $5, dis 10 %
Weights.—Window Weights..... ₩ lb 2½c
Wire Netting.—Clinton Wire Cloth Co., Green, Drab or Black..... ₩ ft 6c
Wrenches.—Genuine Wrenches, A. G. Coes..dis 40&5 %
Wringers.—
Novelty and Universal } Tub No. 2 } ..... market unsettled
Eureka..... per doz $60 00
Novelty Bench, No. 4..... market unsettled

Boston Metal Market.

(Corrected by Fuller, Dana & Fitz.)

Tin Plates.—₩ box

I. C. Char. 10x14	@ $11 50		
I. C. Coke 10x14..	9 50		
Char. Roof. IC, 14x20,	11 25		
Coke " IC, 14x20,	10 25		

Pig Tin.— ₩ lb

Banca.....	30c	Sheet & Pipe..	34c, dis 10 %
Straits.....	23c	**Spelter.....**	₩ lb 6c
English.....	24c	**Antimony.....**	₩ lb 14c

Zinc.—Sheet..... ₩ lb 10c

Iron.—Sheet Iron, Russia..... " 18c
Sheet Iron, English..... " 5 c
" " American Refined..... " 5½c
" " Galvanized..... " 10c
Plate Iron..... " 3½c
Swedish and Norway Bar Iron, gold..... ₩ ton, $120 00
" " " Shapes, gold..... 125 00
Norway Nail Rods, first quality, gold..... 145 00
" " second " 135 00
Best Refined Bar Iron 65 00
The "Burden Best" Iron..... 95 00
American Pig Iron, Foundry, No. 1, X..... 32 00
" " " No. 2, X..... 31 00
" " Gray Forge..... 28 00
Scotch Pig Iron..... ₩ ton 36 00 @ 39 00
Wrought Scrap Iron..... 36 00

Steel.— ₩ lb

Eng. Tool.....	18c	German	10c
American Tool	14½c	Spring.....	7½c
" Mach	10c	Tire.....	6½c
Bessemer.....	7½c	Sleigh Shoe.....	4½c
		Toe Calk.....	7½c

Copper.— ₩ lb

Sheathing.....			33c
Bolts.....			33c
Bot.....			28c
Ingot.—			₩ lb
Pig.....			23c
Sheet & Pipe..	34c,	dis	10 %
Spelter.....			₩ lb 6c
Antimony.....			₩ lb 14c

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Apple Parers.—Conqueror..... ₩ doz, $8 50
Hudson's Rotary..... " 9 00
Axes.—James & Co.'s..... " 11 50
Pioneer..... " 12 50
Lippincott's..... " 12 00
Hunt's..... " 12 50
Axles.—Kritch & Crane Mfg. Co.'s—
Patent Taper Axles, Swelled Taper, Concord and Red Jacket Axles..... list net
Common Axles, 1¼ inch and upward..... ₩ lb 7¼c
" " less than 1¼ inch..... " 7¾c
Bellows.—Best St. Louis make..... 60c ₩ in. dis 15 %
Bells.—Troy, Church, School and Farm Bells.. ₩ lb 43c
Bolts.—Arms, Bell & Co.'s Carriage and Tire... dis 75 %
Arms, Bell & Co.'s Machine..... dis 30 %
Butts.—Western Butt Co.'s—
Narrow Fast Joint..... dis 25 %
Broad Fast Joint..... dis 50 %
" Loose " ..... dis 60 %
Reversible..... dis 50&10 %
" Japanned and Silver Tipped..... dis 50 %
Loose Joint "Acorn" " ..... dis 55 %
Corn Cutters or Hooks.—Solid Steel.... ₩ doz $4 00
Corn Knives.—Dunn E'ge T'ol Co.'s Clip.. " 5 75
Seymour Mfg. Co.'s Solid Steel Back..... " 5 00
Corn Shellers.—Sandwich Mfg. Co.'s—
Power Shellers..... dis 10 %
Hand Shellers..... Special rates
Cotton Gins.—Dubois Patent..... dis 10 %
Crow Bars.—Steel Pointed..... ₩ lb 7c
Drag Saw Machines.—
Culver's Iron Drag Saw..... dis 10 %
Robinson's Patent Sweepstakes Drag Saw..... dis 10 %
Fanning Mills.—Nash & Cutt's..... dis 15 %
Feed Cutters.—Burdick's National..... dis 15 %
Baldwin's American..... dis 15 %
Sanford No. 1, $12 00; No. 2, $8 75..... net
Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks.... dis 33¼ %
" " Handled Hoes..... dis 33¼ %
Grinding Mills.—French Burr Mills..... net list
Challenge Feed Mills..... dis 30 %
Sedgebeer's Nonpareil Mills..... dis 10 %
Osage Corn and Cob Mill..... dis 30 %
Hammers.—Masons' Hammers..... ₩ lb 20c
Smiths' Hand..... " 22c
Handles.—No. 1 Fork, Hoe and Rake..... dis 20 %
No. 2 Fork, Hoe and Rake..... dis 40 %
Harrow Teeth.—1 inch iron..... ₩ lb 4½c
⅞ and ¾ inch iron..... " 4¾c
Barbed or Headed..... ½c extra
Hay and Cotton Presses.—
Dederick's Railroad..... dis 5 %
" Perpetual..... net
Hay Knives.—
Dunn Edge Tool Co.'s..... ₩ doz $14 70—dis 15 %
Lightning (Weymouth's Patent)..... ₩ doz 3 00 00
Horse Hay Fork.—Nellis' Harpoon..... dis 20 %
Horse Nails.—National Patent Pointed..... 20c rates
National Patent Pointed, extra finished..... 25c "
Horse Powers.—Pitts or Carey's Patent..... dis 10 %
Wheeler's Railway..... dis 10 %
Sandwich Lever..... dis 10 %
Horse Rasps.—Heller Bros..... dis 45 %
Horse Shoes.—
Rhode Island (Perkin's Pattern)..... ₩ keg, $6 50
" Mule..... " 7 50
" Trotting Shoes..... " 9 00
Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks.. ₩ doz $14 75 @ 15 25
" " Grub Hoes, oval eye..... " 10 75 @ 12 00
Nails.—Wheeling..... $3 20 rates
Order for 100 kegs 10c per keg less.
Picks.—Klein, Logan & Co.'s Railroad and Clay..... ₩ doz $10 50 @ 11 75
Klein, Logan & Co.'s Coal..... " 8 00 @ 9 00
" " Pole..... " 12 00
" " Stone..... " 15 00
" " Tamping..... " 17 50
Plows.—Avery's Cast and Steel..... dis 15 %
Collins Cast Steel..... new list net
Pekin Steel..... new list net
Post Hole Augers.—Clark's Patent—
No. 1, ₩ doz. $27; No. 2, $30; No. 3, $32..... dis 25 %
Rake.—Paddock's Premium Sulky..... $30 00 net
St. Louis Revolving 14 tooth..... 5 50 net
" " 16 " ..... 6 00 net
" Hand Hay Rake..... dis 10 %
Reaper Knives and Sections.—
Geo. Barnes & Co.'s Knives..... dis 20&5 %
" " Sections..... dis 25 %
Road Scrapers.—Steel..... dis 25 %
Cast Iron..... dis 10&2½ %
Sad Irons.—Monitor Brand, Silver Polished.. ₩ 24c
Sash Weights.—Standard Solid Eyes..... ₩ lb 3½c
Saws.—Hubbard, Lippincott, Bakewell & Co.'s.. dis 10
Branch, Crooks & Co.'s..... dis 15
Scythes.—Dunn Edge Tool Co.'s..... new list dis 25
Scythe Stones.—No. 1 Ind'n Pond ₩ gr's, $7 00
Extra Indian Pond..... " 7 50
Premium..... " 9 50 } dis 25
Diamond Grit..... " 13 50
Shovels, Spades and Scoops.—
Lippincott's..... dis 30 %
Sledges.—Smith's Stone or Coal Sledges—
Steel Face Polished..... ₩ lb, 15c
Solid Cast Steel..... " 25c
Snaths and Cradles.—Seymour Mfg. Co.'s.. dis 30 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express..... dis 10 %
Blue Seat Springs..... dis 15 %
Thimble Skeins.—Pump & Skein Co.'s..... dis 60 %
Vises.—Solid Box..... ₩ lb 16c
Wilson Mfg. Co.'s..... dis 15 %
Wheelbarrows.—Railroad & Garden..... new list net
Wrenches.—Coes' Genuine..... dis 33½ %
Coes' Pattern..... dis 50 %
Wringers. Crown..... ₩ doz $60 00
Wagons.—Whitewater Farm Wagons—
Thimble Skein..... No. 3, $20; 3½, $24; 3½, $25
Iron Axle..... No. 1½, $75; 1¾, $90; 1½, $95

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. Sellew & Co

Tin Plate.

IC, 10x14, Char	$11 00@11 50	IX, continuous,	
IX, 10x14, "	14 00	70 in. x 300 ft.....	
IC, 12x12, "	12 00	IC, 10x14, best	
IX, 12x12, "	14 50	Coke.....	$10 00
IC, 14x20, "	17 50	IC, 10x14, good	
IX, 14x20, "	15 00	Coke.....	10 00
IC, 14x20, Terne	$10 75@11 00	IC, 10x20.....	17 00
IX, 14x20, "	15 50	IC, 14x20.....	10 50
IC, 20x28, "	21 00@22 00	IC, 14x20, Coke Lead.	₩ lb
IX, 20x28, "	25 00@26 00	IC, 10x14, punch'd for Safes.....	10 00
IC, continuous 20 in. x 200 ft.....			

Block Tin.

Large Pigs Straits..... 28c | Bars..... 30c
Small " English..... 27c |

Sheet Zinc.

Casks..... ₩ lb 10c | Sheet..... ₩ lb 10½c

Solder.

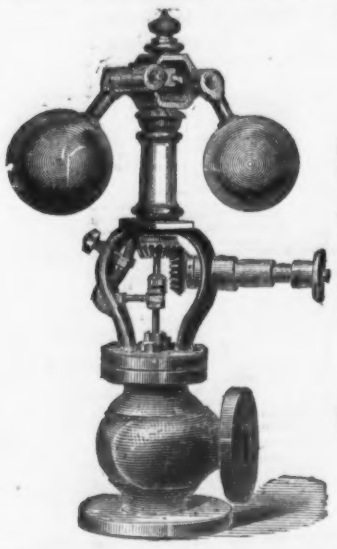
No. 1, Refined, in bars or plate..... 17c
No. 2, " " " 16c
Pig Lead..... 7½c

Sheet Copper.—18 to 100 lbs. Sheets 30x60..... 32c
14 to 16 lbs., Sheets 30x60..... 32c
10 to 12 lbs., " and 30x72..... 36c
6 to 9 lbs., " 38c
Tinned, 14 and 16 oz. 14x48..... 31c
Planished, 14 and 16 oz. 14x48..... 37c
" No. 7, 8 and 9..... 39c
Copper Bottoms..... 32c

Sheet Iron.

	Com'n.	Sm'th.	Char'l.	Jun'ta.
No. 16 to 20	4¾c	5¾c	7¾c	9¾c
No. 22 to 24	4¾c	5¾c	7¾c	9¾c
No. 26	5 c	6 c	8 c	9¾c
No. 27	5¼c	6¼c	8¼c	10c

Galvanized Iron..... dis 20 %
Iron Rivets..... dis 25 %
Iron Wire..... dis 25 %
Coppered Market Wire..... dis 30 %
Copper Rivets and Burs..... dis 25 %
Russia Iron.—Nos. 9, 10, 11 and 12. ₩ lb..... 20c
No. 1 stained. ₩ lb..... 18c
Imitation Russia. ₩ lb..... 15c
Retinned Stamped Ware..... dis 20 %



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We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

Shive Governor Co

BETHLEHEM, PA.

ALSO,

SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR.

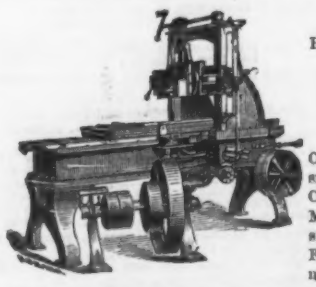
The Best and Cheapest Watcher of the Watchman made

PRICE ONLY $15.

Circulars sent free.

The Pratt & Whitney Co.,

Hartford, Conn.,



Have constantly on hand and making

Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

RICHARD DUDGEON,

No. 24 Columbia Street, New York,

MAKER AND PATENTEE OF

Hydraulic Jacks and Punches,

ROLLER TUBE EXPANDERS

And Direct-Acting Steam Hammers.

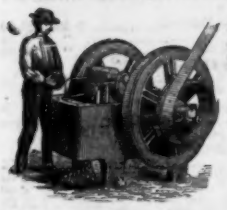
Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order.

BLAKE'S PATENT

STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing **Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c.**

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BLAKE CRUSHER CO., New Haven, Conn.

Persons visiting New York, can be shown a crusher in operation at 197 Elm St

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STAVE SAW.

Gauge Lathes, Screw Machines,

Stave Saws, Woodworth Planers,

Tub, Pail and Chair Machinery a specialty, by

GOODSPEED & WYMAN, Winchendon, Mass.

CORLISS STEAM ENGINE.

The Best in the World for Economy in Fuel and Cost of Running.

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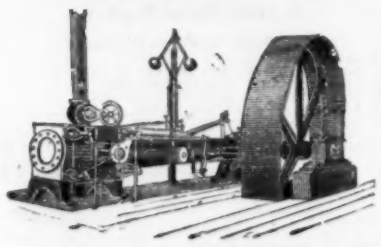

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Engineers, Machinists, Founders,

And BOILER MAKERS.

Stationary Engines, Shafting, Mill Gearing, Hoisting Machines, Improved Piston Packing and Machinery.

Special attention given to Boring Ports and Cylinders.

Philadelphia Forging Works.

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Wrought Iron Carriage & Wagon Hardware

AND ALL DESCRIPTIONS OF

Steel & Iron Drop Forgings

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Guild & Garrison's Steam Pump Works,

Nos. 30 to 34 First Street, Williamsburgh, N. Y., Manufacturers of

Steam Pumping Machinery

Of all descriptions and for all purposes, of any proportion or size, for pumping Hot, Cold, Fresh, Salt, Muddy or Gritty Water, Grain-mash, Syrups, all kinds of Beer, Acids, Molasses, and all heavy and thick fluids. Also for Feeding Steam Boilers, Supplying Tanks, and for Sugar Refineries, Tanneries, Oil Refineries, Gas Works, Hotels, Breweries, and for all classes of manufactories: for Draining Mines and Excavations, and for Rolling Mills, Blast Furnaces and Water Works supplying Cities, Towns and Villages with Water; also, for Wrecking purposes and Steam Fire Engines for Land and Sea.

Also, Manufacturers of Vacuum Pumps, Duplex and Single, and Copper or Iron Vacuum Pans of all sizes and for all purposes, with complete fixtures for Refining Sugar, Corn Syrup, Glue, &c., or for condensing Milk, Extracts, Chemicals, &c., &c.

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All Work from this Establishment fully Warranted.

A Written Guarantee given with our Pumps.

ENTERPRISE HYDRAULIC WORKS,

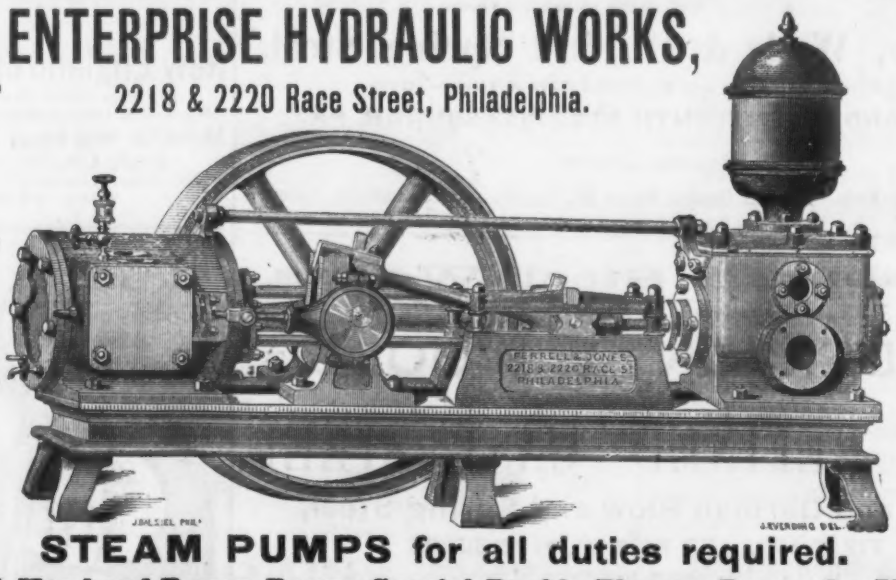
2218 & 2220 Race Street, Philadelphia.

Fan Blowers.

Piston Blowers,

"FOULDS"

Patent Water Elevator.



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STEAM PUMPS for all duties required.

Centrifugal, Hand and Power Pumps, Special Double Plunger Pumps for Mining Purposes. Boiler Feed and Tank Pumps.

Woodruff Iron Works,

Office, 223 State Street, Hartford, Conn.

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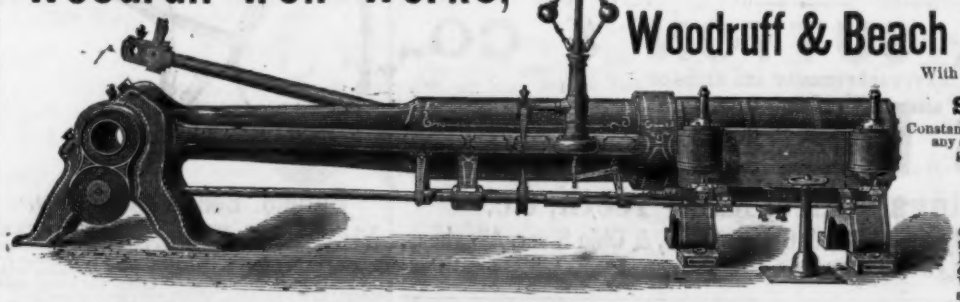

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With recent valuable improvements.

Steam Boilers

Constantly on hand and made to order of any size or style. Special attention given to the manufacture of

MILL WORK

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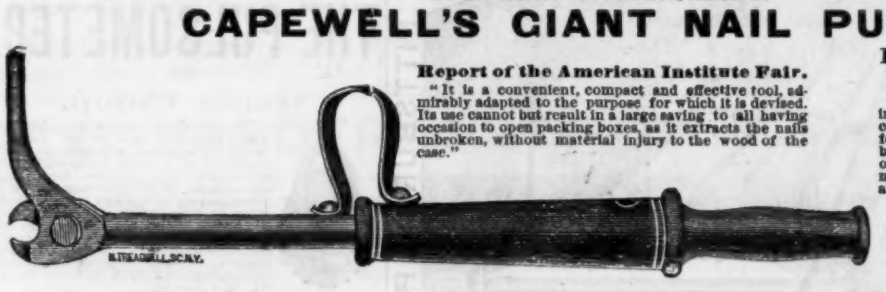

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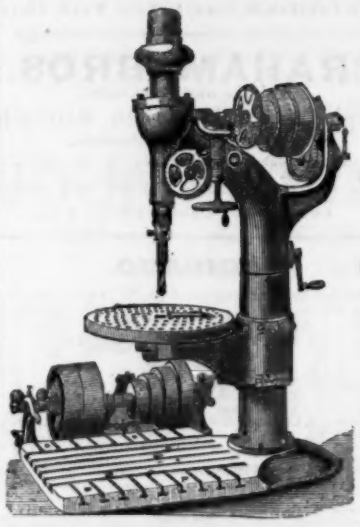

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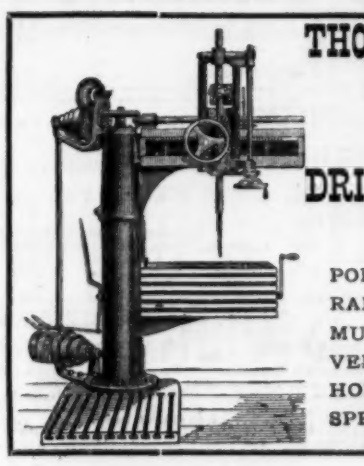

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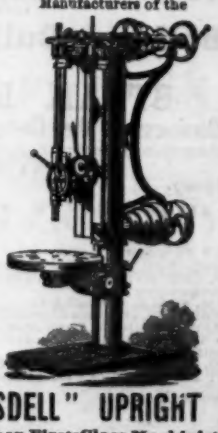

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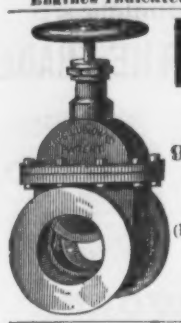

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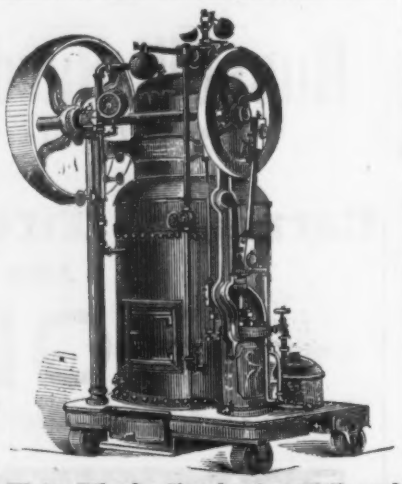

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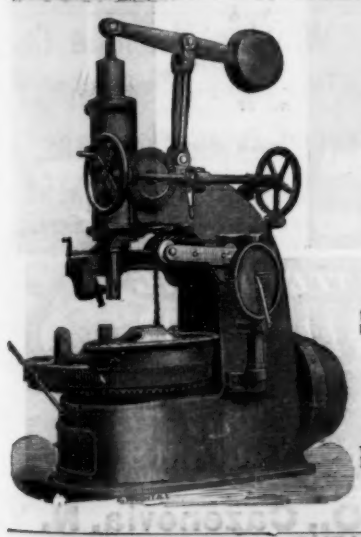

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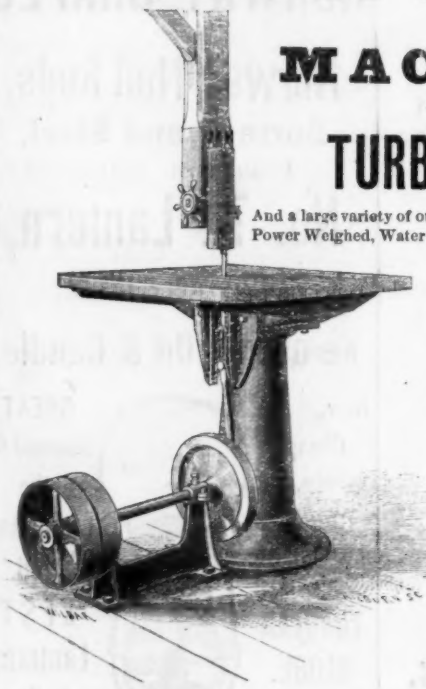

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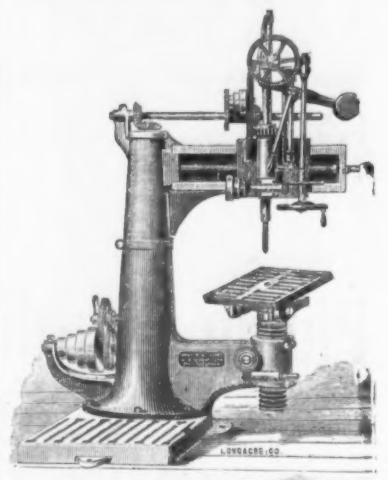

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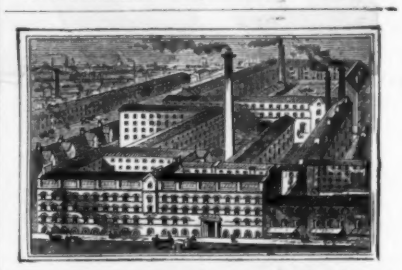

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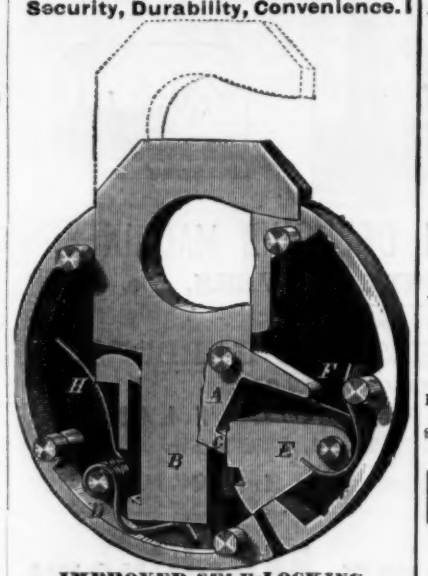

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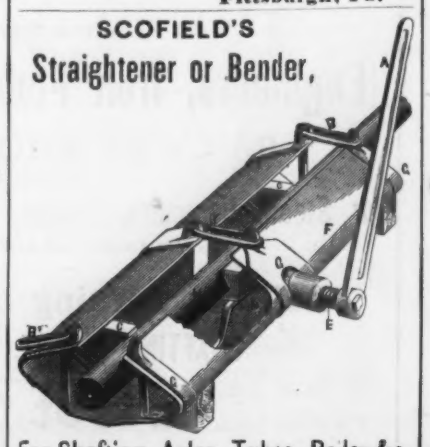

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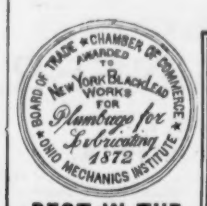

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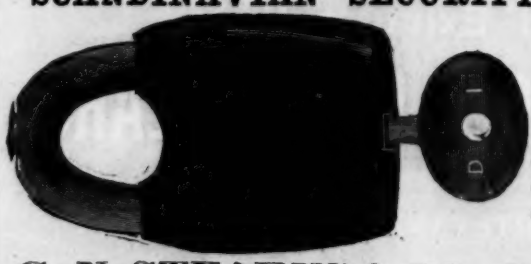

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